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MEETING OF THE WESTERN GAS ASSOCIATION.

The Annual Meeting of this Association was held on the 10th, 11th and 12th days of May, under the Presidency of Mr. Thomas Butterworth, of Rockford, Illinois.

The address of the President, which will be found in another column, is an admirable, practical, business-like document, and will be read with interest by all concerned. The proceedings in full will be given to our readers at the earliest possible day. The growing benefit of these meetings is becoming more and more apparent each year, and the discussions that take place, the friendly greetings, and the better knowledge of each other resulting from the coming together of those engaged in a common profession, all tend to strengthen the position held by the gas business throughout the land.

Of one thing there need be no doubt in the mind of any intelligent man, interested either professionally or financially in legitimate well-conducted gas enterprise, and that is that it will not only hold its own against all comers, but will continue to increase and develop more rapidly in the future than ever before. There is a great amount of money invested in the business, and it supplies an article necessary to every household that will be found more reliable, more useful, more free from danger and annoyance and more economical than can be supplied from any other source. Special causes may and will contribute to make other means of illumination useful and perhaps desirable; but there is no other agent, aside from its light-giving, that is so applicable at the same time to other uses as the material furnished by the gas makers of the country.

The position of the business is vastly changed from what it was a few years since. The price is much lower and the quality much higher, the uses, outside of mere lighting, much more numerous, and the proper methods of employing it much better understood than formerly; and the true cause for this improvement is to be found mainly in the influence exerted by the various associations of managers who meet together not only to impart information to each other but to find out where they are deficient in information. It is an old saying that one who never makes a mistake seldom learns anything; and there is no way so practically good for a man to discover his errors as to submit his theory and practice to others conversant with the subject for criticism and discussion. It may be true that false theories, and bad practice, may be set forth as good; but the crucial test of honest fair discussion, by fellow-laborers in the same field, will soon winnow the chaff from the wheat, and the reasonable practical common sense of a number of minds will be benefited and strengthened by the conflict, while the advocates of errors may be convinced and set right for the future.

The main thing which is brought out in every meeting of this kind, at this time, is the importance of securing the great advantage which will result from increased business; and one prominent method for securing this seems to be a reduction of the selling price to such a point that it will place gas within the reach of all for the various uses to which it is adapted in a superior degree, and, at the same time, give a fair return upon the capit invested.

A fact well known to the gas maker, but seldom understood by the consumer, is that over one-half of the plant in a gas factory is idle more than half the year, while all the distributing plant is practically unused for an average of say sixteen hours out of the twenty-four; and this brings us to a point which must be borne in mind constantly, viz., that while the money is made in the retort house it is true that much of it is lost in distribution. The cost of distribution proper is out of proportion to the absolute cost of manufacture. The best way to reduce this cost per thousand feet is to increase the amount of time in the day during which the distributing plant is well employed. Secure the extension of the uses of gas that will employ the mains in the daytime. Day consumption, from use in stoves, engines, and mechanical operations of every kind, is what is wanted to enable the manager to reduce the selling price of gas, and this is the point to be obtained by concerted action all along the line. Manufacturers of apparatus will soon supply the means (the instruments to operate with), and if they do not others will spring up who will; but the gas companies should lose

no opportunity to push the information before the people, and draw their attention to what can be done with the article they have to sell. In fact, the management should show the same energy, perseverance and skill in developing their business that any successful merchant does in any other business.

In most of the Association meetings thus far the main attention has been devoted to the economy of manufacture itself; but we are glad to see that the other, and fully as important part of the business, the commercial end of the line, is beginning to attract attention. No men understand this better than our Western friends, and we trust that these examples may be followed, and the fact may be recognized that the selling of gas is just as important as its manufacture to the investor.

We congratulate the Western Association upon its usefulness thus far and feel confident that the bright future which it has before it will be appreciated by all. A few years hence will see many works which are now relatively small enlarged and extended to no mean proportions, and we doubt not that many of these will be made more and more remunerative from the fact that their managers have availed themselves of the many advantages enjoyed at the meetings of the Association.

Society of Gas Lighting.

The regular monthly meeting was held at the Jersey City Gas Works, on the 18th ult., and the following paper was read by Mr. William Combe, on

THE RELATIVE VALUE OF FIRING FURNACES WITH HOT AND COLD COKE.

The relative value of firing furnaces with hot and cold coke having been from time to time a matter of discussion in the Society, and our leaning being towards the former rather as a means of economy of labor than the saving of fuel, it occurred to me that it might be of interest to test the subject by careful experiment. This I have endeavored to do, and give the results of several trials in the tabulated statement.

I have discarded the measurement by bushels, and have relied solely on that of weight.

I have assumed that the total weight of coke made in the *hot* coke bench is the same as that from the bench where the cold coke was used.

Experiment Number.	Coal Carbonized in 24 Hours.	Total Coke Made.	Coke Used.			Remarks.
			Furnace, 24 hrs	Per Cent. of Amount Made.	Per Ct. of Coal Carbonized.	
	Pounds.	Pounds	Pounds.			
1	7380	5115	2499	48.85	33.86	Furnace fed with cold coke.
	7380	5115	2165	42.32	29.33	" " hot "
2	7380	5050	2476	49.03	33.55	Furnace fed with cold coke.
	7380	5050	2130	42.17	28.86	" " hot "
3	7380	5320	2445	45.95	33.13	Furnace fed with cold coke.
	7380	5320	1994	37.48	27.01	" " hot "
4	7680	5078	2122	41.78	27.63	Furnace fed with cold coke.
	7680	5078	1840	36.23	23.95	" " hot "
5	7740	5210	2207	42.36	28.51	Furnace fed with cold coke.
	7740	5210	1868	35.85	24.13	" " hot "
			RECAPITULATION.			
	37560	25773	11749	45.58	31.28	Furnace fed with cold coke.
	37560	25773	9997	38.78	26.61	" " hot "

The result of my experiments show a decided saving of fuel in the use of hot coke amounting to 6 8-10 per cent. in the quantity used of the coke made and 4 60-100 per cent. of the coke used, when compared with the weight of coal carbonized.

OBITUARY.

MOSES TAYLOR.

A long life of usefulness and energy was brought to a close by the death of Mr. Moses Taylor, of New York city, on Tuesday, May 24th. Mr. Taylor was a man who was well known to the banking and commercial interests of the United States, and it is entirely unnecessary for us here to speak of the causes which brought him into prominence. He was born in New York city, in 1806, and from his early boyhood had been closely identified with the financial and commercial interests of the Metropolis.

For a number of years, indeed up to the time of his death, he was an active and influential member of the Board of Directors of the Manhattan Gas Light Company, of this city; and to his independence and courage much of the phenomenal success which has been attained by this company is to be attributed. His charities were wide and unostentatious, and his death will be regretted and mourned by thousands.

Gas and its Future.

The great interest of gas making firmly withstands the most elaborately organized assaults of paid detractors. Like some sturdy oak of immemorial antiquity, whose unimpaired vigor is reattested by the rude blasts of each successive winter, the persistent efforts to depreciate gas shares only demonstrate more clearly the inherent vitality of the property. The glib professor, the hireling journalist, and the *dilettante* elecrician—whose smattering of the science has been picked up at a popular evening lecture or at an electrical *conversazione*, where the new lights and the pretty but useless electrical novelties are discussed to the accompaniment of coffee and buns and vapid flirtation—have united in predicting the universal substitution of electricity for gas. The foolish rhapsodies in which the future achievements of the light have been sung have indeed been a "weariness of the flesh," and their absurdity is more and more palpable in view of the continued failure of electricity for domestic purposes, the ever-swelling consumption of gas, and consequent growth in the receipts of the companies.

The possibility of almost infinite development in the uses to which coal gas may be applied has just received a remarkable illustration. That great corporation The Gas-Light and Coke Company has just issued to its customers a card announcing its readiness to lend on hire stoves of approved manufacture for heating and cooking purposes. The greater economy and efficiency of gas cooking as compared with cooking by the familiar coal fire has been completely demonstrated. Gas cooking has now conquered the prejudices—born of the defects that undoubedly belonged to the first stove—with which it was greeted at the outset. The admixture of atmospheric air with the gas before ignition takes place has at once purified the flame and enormously increased its heat. Gas cooking stoves are now extensively used in the kitchens of hotels, restaurants and large establishments; but their economy and extreme convenience are no less demonstrable in private dwellings. The compact stove which the companies now supply to consumers furnishes the housewife with a complete culinary equipment. In addition to the ordinary processes of roasting and baking, an ingeniously contrived grill enables a steak or chop, or the various accessories of a dinner, to be broiled as efficiently as over a bright coal fire, with the further advantage that the flame being thrown on the top by means of a fire-clay reflector, the nutritious juices of the food descend to the plate, and are not wasted in the fire. The chances of badly cooked food, where the mistress of the kitchen has no claim to be reckoned a *cordon bleu*, may be greatly mitigated by the use of a gas-stove, owing to the facility with which the heat may be regulated, and the total absence of smoke.

It is difficult to assign any limit to the possible growth in the supply of gas for other than lighting purposes. An eminent scientist has shown us that coarser gas than that now supplied would yield a far greater heat, and, but for the difficulty of providing a duplicate service of mains, this mode of warming houses might be far more generally applied, and with better results in respect to economy. Another important outlet for increased consumption is the great advance in street illumination recently noticeable in London, as burners of vastly improved construction are rapidly superseding the flat-flame burner. It would be premature as yet to estimate the increased consumption of gas from this cause, but it will certainly be very considerable. Among other useful functions of gas may be also mentioned its growing popularity as a motive power. But pre-eminent, perhaps, in prospective value over the primary article of gas itself are the residual products of its manufacture. During the last few weeks there has been a gradual and steady increase in the market value of these products, showing that this element of profit to the gas companies will yet assume larger proportions. This is a source of profit which, the investor in electric lighting shares should never forget, is entirely lacking in the case of the new companies. The creation of the electric light is unattended by any residual compounds whatever; while the greater the output of gas, the greater is the revenue derived from residual products.

The unerring barometer of the Stock Exchange bears eloquent testimony to the excellent future before gas companies, the shares of leading London concerns having marked a substantial advance within the last ten days. We have repeatedly declared that gas has nothing to fear from the rivalry of the electric light, and further investigation enables us to re-affirm this conviction more confidently than ever. Secure in the possession of splendid plant, admirable organization and management, the position of the gas companies may well be deemed virtually unassailable.—*Money*.

[From the London "Journal of Gas Lighting."]

Midland Association of Gas Managers.

The Fifth Annual Meeting of this Association was held at the Grand Hotel, Birmingham, on Thursday, April 27, the President, (Mr. R. O. Paterson, of Cheltenham) in the chair.

The Honorary Secretary, (Mr. W. North, of Stourbridge) read the minutes of the last meeting, which were confirmed and signed.

The election of Mr. Hack, of the Saltley Gas Works, as a member, was agreed to, and the President congratulated him on joining the Association.

Mr. Hack said he had to thank those present for accepting him as one of the members.

THE PRESIDENT'S ADDRESS.

The President then delivered the following address:

Gentlemen:—In taking the Presidential chair for a second year, it is incumbent upon me to express to you the high appreciation I have of the honor conferrsd upon me. My thanks must, in the nature of things, partake somewhat of the character of a formal repetition; but they are nevertheless sincere and heartfelt, and it would be a small compliment to you if I refrained from giving expression to my deeply felt sense of your trust in me in electing me to fill this chair a second time.

The circumstances under which we are holding our fifth annual meeting at so late a date of the year are known to you all. The wisdom or policy of deferring our annual meeting, under any circumstances whatever, is perhaps a matter that may be open to question; but in this case you will no doubt consider that your Committee acted prudently in taking upon themselves the responsibility of postponing it. The uncertainty as to the period of the visit of the Gas Institute to the Electrical Exhibition at the Crystal Palace made it almost impossible to fix a day with anything like a certainty of its not clashing with the more important gathering; and further, the Committee thought it was paying a proper respect to the President of the Institute, to wait until his final announcement was made before our own meeting was fixed. From unforseen circumstances the visit to the Crystal Palace was delayed to a time far beyond what was originally anticipated; and on this account it was found that it would be more convenient not to have our annual meeting until after the March quarter, at about the end of which time we are all busily engaged.

It would seem to be impossible to address you from this chair without making some mention of electricity. Those of us who visited the Crystal Palace on the 28th of February—in company with a large number of members of the Gas Institute, directors of gas companies, and committee-men of corporations—will hardly be prepared, I imagine, to admit (notwithstanding all that has been said and trumpeted in our ears, and presented to our view) that electricity and electric lighting companies are, in any serious sense, rivals of gas companies. That electricity may be adapted to purposes of illumination is, of course, not disputed; and, perhaps, in this sense, to some degree electricity may be said to be a rival illuminant. But, in just the same sense, so is petroleum oil. Gas authorities, however, have never had a fear that petroleum—notwithstanding its cheapness—would jeopardize the value of their property. And why? Simply because of its unadaptability to the varied requirements and uses of a community. And so we judge electrtcity. It never can be adapted to meet the demands for lights large and small, numerous and few, of a moderate town. To a gas manager the difficulty of supplying a district with light, in ever varying quantities during the lighting period of a single day, is sometimes no easy matter; but to meet the case with electricity would indeed be a difficulty of insuperable magnitude. One need only compare the long array of boilers, engines, dynamo machines, shafting, etc., required to generate the electric current to do but a portion of the lighting of the Crystal Palace, with what would be required to supply, say, the Strand, to be convinced of the utter futility of the whole thing to supersede gas.

On the cost of the electric light there was absolutely no information to be obtained at the Crystal Palace. Those managers who went up unaccompanied by members of their directorate must have felt themselves under some difficulty when they attended the next board meeting, and were expected to give definite information as to the cost of the light. The persistent and almost frantic efforts that were made, by one and another, to get at such data as would enable even an approximate estimate of cost to be made, were of no avail; and the conflicting statements that one had to deal with made it impossible to come to any conclusion. Since then, however, the inventor of one of the most popular of the indandescent lamps—Mr. Swan—has delivered a lecture at the Royal Institution, from which some idea of the cost may be gathered, viewed from the vantage ground of electricians. Mr. Swan's estimate is that, weight for weight, coal burned in a steam boiler will, through the medium of an engine and a dynamo machine, produce 2½ times more light in an incandescent lamp than when converted into gas in the ordinary process of gas making; and this after allowing for the value of the residual products. But he has certainly taken credit for a very high class of boiler and engine, for he estimates the consumption of fuel required to develop one horse power at only 2½ lbs. Such a small consumption may be attained, with the best possible apparatus, for a limited time, but not for long. At any rate, the splendid boilers we saw at the Crystal Palace were said to be using 4 lbs. of coal per horse power; and I thought it was low even at that. But if Mr. Swan's figures are to be discounted to this extent, they assume a different aspect. We shall have 1 cwt. of coal giving 28 horse power instead of 50; or 4,200 candles instead of 7,500—as compared with 1,000 cubic feet of gas; or 3,000 candles (at 3 candles to the foot) as Mr. Swan estimates it, or 6,000 candles as we claim to estimate it. If we must be confined to comparisons on simply theoretical grounds such as these, the cost based on such lines must be regarded as utterly unreliable. The question is a practical one, and one that must be answered in a practical way sooner or later; and how electricians have been able so long to stave off giving a direct answer to the question, to an eager and expectant public, is difficult to comprehend, except it be that the promises have been so profuse as to blind them to their ignorance. Mr. Swan's lecture was in every respect reassuring and instructive; but he leaves the question still unanswered, What is the cost of the light to the consumer? That it is several times dearer than gas may be looked upon as settled, although it is impossible to say whether it is 6 times or 20 times dearer.

Laying aside the question of cost—which we are justified in assuming is greatly in favor of gas (even from the electrician's point of view) when the cost of maintenance and distribution is taken into consideration—it may be asked, Does electricity offer that ready adaptation as a lighting medium required under the ordinary circumstances of our existence? I think it must be said that it does not; and the conspicuous failures of the electrical engineers, in their attempts to supersede gas in the public thoroughfares (the least difficult of all the work done by gas) in Chesterfield and elsewhere, are sufficient to show that it is not. It is one thing to set up a boiler, with the necessary machinery, and produce the electric light on the spot; but it is quite a different thing to transmit it through miles and miles of copper conductors, and distribute it, in ever varying amounts, throughout a district, as the absolute requirements or caprice of the users may desire, at a price to compete with gas. But, besides, is it, as Mr. Swan asks, "safe to distribute electricity of comparatively high tension?" The action of the Insurance Companies in relation to the exhibition at the Crystal Palace seems to point to a very alarming risk and danger. It may be a bold assertion to make, but I utter it with unfeigned belief, that in five years' time (if no sooner) we shall have the last of electric lighting for many a long year to come. We wish it, nevertheless, no evil. Electricity has a field of its own; but it is not in the direction in which its devotees have lavished so much labor and scientific skill, and gas companies need never yield an inch of ground to it if they do but do their duty to themselves and the public—not simply as they have done it in the past, but as it should be done in the face of a new combination of circumstances.

Instructive as the visit to the exhibition was, as showing us how little we have to dread the scientific skill and commercial enterprise of the electrical engineer in his assaults upon us, it was infinitely more pleasing to find it an occasion on which—for the first time, I think, in the history of the Institute, whether under its old or new name—it was the medium of direct intercourse between gas authorities, in the persons of directors of gas companies and committee men of corporations, and the members assembled as a society of gas engineers. As the period of each annual meeting comes round, gas authorities generally, I fear, are in the habit of looking upon the Institute as a sort of "Mutual Improvement Society," got up for the personal enjoyment of its members, without giving them credit for having any interest or care for the prosperity or continued well-being of the property of gas proprietors. Let us hope this idea will be speedily abolished, as I am sure it already is in the minds of all those gentlemen who joined the members in their visit to the Crystal Palace. It is impossible to estimate at its true value the benefits gas proprietors, and the public generally, have derived from the formation of Gas Institutions and Associations in this country within the last twenty years. Viewed abstractedly, it may safely be affirmed that, but for the impetus given to the profession from the rivalry and friendly intercourse of our periodical gatherings, the gas authorities of this country would not have been in such a strong position as they are at the present moment, to defy competition from the electric light. Gas is now sold at a price which a few years ago could not have been dreamt of; and this result is mostly due to the economy of management which has resulted from the spread of information through such societies. We, individually, have to acknowledge, and should do so, our very great obligations to them; but how much greater is the indebtedness of the gas interests generally. It may indeed be said that we are only doing our duty to our employers in seeking to improve our processes and seeking to discover new ones; and this is quite true. But it should be remembered that, while in our societies we are doing all this, we are not seeking after our own individ-

ual interests. The experience and skill of an engineer and manager in one part of the country has, perhaps, enabled him to achieve more than ordinary success in some one of the many operations of our manufacture; and the result has been an enhancement of the value of the property of his employers. The improvement has been accomplished by his superior ability; but instead of confining his knowledge within the four walls of his works—as used to be done in the old days, before we fell into the habit of meeting together—he at once communicates it to his brethren, it may be by reading a paper, or by taking part in a discussion, or perhaps more probably he is button-holed by some who have heard rumors of what he is doing at home, and to them he readily imparts his knowledge, and so speedily the matter becomes the common property of all. Gas proprietors then, at no cost to themselves, are the richer for it. This is the kind of thing which is continually going on in our midst, and gas proprietors will never know fully how much they owe to the inauguration of Gas Managers' Associations.

Proprietors of gas works are very slow to appreciate this fact, although they have reaped such enormous advantages from it. It was a painful experience through which we passed last year—when arrangements were being made for founding the gold medal, for presentation to the Gas Institute, for the encouragement of originality of research in connection with gas manufacture—to find so few gas authorities supporting the scheme. It was successfully accomplished, to the honor of the Midland Association and its friends; but it was a disheartening thing to find those who must be most benefited by it withholding their support, through some mistaken idea of its purport. Gas companies and corporations generally can only be studying their own interests by giving all the support in their power to the various Associations of Gas Managers.

A director of a gas company who attended the meeting of the Institute at the Crystal Palace, and who is a keen observer, said to me that he was favorably impressed with the hundreds of managers he met on the occasion—and he remarked that the earnestness of purpose he saw depicted on the faces before him assured him, as a gas shareholder, that the electrical engineers would have a hard battle to fight before they vanquish such a body of earnest, practical and scientific men. This gentleman had never seen a body of gas managers and engineers before; and I think his opinion was highly complimentary, and I can only wish that gas directors generally would throw themselves in our way and learn to know more of our work and aim. As members of the Midland Association we owe a duty to the Institute, and I think we should be doing it good service, as well as strengthening the position of the whole gas industry in the country, if we were to bring prominently before our several boards and committees its claims, and invite them to give it their countenance and support. Whether we care to admit it or not, the time will again come when gas companies will have to defend their rights; at present we are enjoying a time of quiet. We are supposed by a credulous public to be on the eve of extinction, and that anything we possess is not worth coveting; but when this fond delusion has been dissipated—the electric light extinct, and our enemies on all hands are awake to find us stronger and more secure than ever—we shall be bitterly attacked. It is wise therefore to be prepared, and the Institute—not now simply an Association of Gas Managers, but "The Gas Institute"—must eventually be the center around which will gather all the combined action and influence of the gas interests of the country, Let us, therefore, individually, do all in our power to strengthen it in the meantime.

The questions of the greatest importance to us at the present moment are, first, that of cheapening; and, next, of increasing the consumption of gas. It has generally been considered that the surest way of increasing consumption is to reduce the price; and while in some measure the one follows as a consequence of the other, it does not always do so of necessity—at least to such an extent as to recoup the loss of revenue caused by the reduction. The character of the place, whether it be a busy manufacturing, or a quiet residential town, interferes with, or controls the operation of the recognized rule. In a manufacturing town the keen man of business speedily discovers some means of benefiting by the reduction, by utilizing gas for purposes to which he had not thought of applying it before; or the shopman, without increasing his outgoings, sees the advantage of augmenting the illumination of his premises, thus making them more attractive and doubtless more lucrative. But in quiet residential towns there is not the same scope for increased illumination. People generally have as much light in their homes and places of business as they require, and a reduction in price, although it may make them less vigilant in looking after and checking the taps, does not to any great extent operate in the direction of the popular rule. Companies in the latter class of towns, therefore, labor under a disadvantage, as compared with the former, in respect to the development of their business by lowering their charges. In Cheltenham, for instance, which is essentially a residential town, the increase of business has not been found (over a series of years) to be proportionate to the reductions made in the charge for gas. The town does not grow with strides and bounds, and most houses above the class of cottages have long since had gas laid on; so that there is little or no scope for the consumption increasing, at least to such a degree as to compensate for a reduction. Many towns are doubtless in the same position; so that, if the price now charged is just sufficient to earn the shareholders' dividends, there would be an end to all further reductions unless means are found to use gas for purposes to which at present it is not applied. It will not be supposed that I am speaking against the exercise of that wisest of all commercial policy—selling our goods at the lowest possible price—for I am convinced that it is the proper thing to do, even if it does not bring in a cent of additional business.

I should like to make a few remarks on the items which mainly control the selling price of gas. These are: The dividend charges, net cost of coal, and wear and tear. These briefly may be taken to represent the main items of cost.

The first of these is the one above all others which most seriously affects the selling price of gas, because it amounts in the provinces to 10d. and upward per 1,000 feet sold, and in the London companies in 1880 to 1s. 1d., which is rather more than the net cost of coal and wear and tear together. In all applications for Parliamentary sanction to create new capital, I suppose companies are accused of having exhausted their old powers too quickly, although this is not considered such a serious delinquency as spending freely out of revenue. If the growth of business is such as to require a large outlay of capital, so much the better for the fortunate shareholders; and if the expenditure has been judiciously made, the public do not suffer in any way. The additional business earns its own profit on the capital laid out to supply it. But if, in order to show large profits, a heedless process of starving the works is pursued, the capital account will be found to have a tendency to grow in a higher ratio than is required for the mere increase of business. Every £1 of capital spent remains a charge for ever; and when we consider that the dividend amounts to somewhere near one-third of the selling price of gas, there is great need to see that it is not unnecessarily disposed of.

Over the next item gas companies can really exercise little control. Coal being bought at the cheapest market, and the most being made of residuals, we have done all we can in this direction to influence the balance sheet. We are compelled to buy our coal at market value; and, as the price of residuals is controlled in the same way, we are entirely at the mercy of that inexorable law of trade supply and demand. Assuming, therefore, that the working results are as good as science and experience can make them, the cost of producing gas under this item is practically beyond our influence.

The third item—wear and tear—is more under control than the last; and it is here I think we are apt to be negligent. It is sometimes a charge against gas companies that they spend more than they should under this heading. It is argued that, by spending too much out of revenue, the price of gas is higher than it should be by the amount of the alleged overcharge. This view of the case is a very plausible one, and is easily grasped by consumers. But the question is, What is the proper amount to allow for the repair and maintenance of a gas company's plant? In the case of new works there will, of course, be a comparatively small amount of repairs required for some years; but the capital once fixed is fixed forever, and upon it the shareholders expect, and rightly so, to receive their legal dividends, not only while the works are new and in thorough repair, but also when they are old, and, it may be, dilapidated. If on the ground of economy (?) in manufacturing expenses the price was reduced in the earlier years to the lowest limit, it is certain that, unless a depreciation fund has been formed and set aside to equalize the cost of repairs and maintenance, the inevitable result must follow sooner or later, of having to raise the price of gas "to make both ends meet;" or else fresh capital must be provided and spent twice over. Which of the two is the more mischievous? This is a suppositious case, but it illustrates my idea. The balancing of revenue and capital expenditure is often a difficult matter, and we have always a great temptation to save revenue and spend capital—a process which is most disastrous, although it may answer the purpose in the meantime. We have to remember that the wear and tear account of a statutory gas company must cover not only the ordinary repairs of the plant, but also the cost of renewals. It is well understood that no amount of repairs will keep a manufacturing plant from ultimately wearing out altogether; and a day must come when, instead of being simply repaired, it must be altogether renewed. Under these circumstances, it would appear to be necessary to do something more than simply repair, if we are to have our works representing the value they stand at in the books. Parliament has prohibited us from forming a depreciation or renewal fund; and I see no other way of meeting the case, except by anticipating renewals in the annual repairs. In ordinary business affairs this principle is thoroughly recognized, and a manufacturer would never think of striking his profit until he had provided not only for his repairs but also set aside something, according to the nature of his business, for the depreciation which he knows his works have been undergoing, and which eventually will have to be replaced en-

tirely. Looking at the nature of our work, and considering the wear and tear that must inevitably take place, I feel sure we more generally undercharge than overcharge the amount.

In Mr. Field's "Analysis of the Metropolitan Gas Companies' Accounts for 1880," it will be found that the expenses for wear and tear of works, mains, and services, less old materials sold, and exclusive of meter repairs, is as follows:

	Per Ton of Coal.		Per 1,000 Feet Sold.	
	s.	d.	s.	d.
No. 1.....	5	0.88	0	6.30
No. 2.....	4	5.83	0	5.64
No. 3.....	8	3.02	0	10.65
No. 4.....	3	11.57	0	5.20

Thus one company spends 8s. 3d. per ton of coal carbonized, or 10.65d. per 1,000 feet sold; whereas another company spends only 5s. 0.88d. per ton, or 6.3d. per 1,000 feet sold—being in each case over a third less. But if we take the percentage of expenditure on the fixed capital of each company (including meter repairs, which do not materially affect the proportion) we find that the latter company does not spend half as much as the former, and in the case of the other two companies the disproportion is equally striking, although it operates in the contrary direction, as shown in the foltable:

No 1,	wear and tear,	3.82	per cent.	on	fixed capital.
No. 2,	"	5.53	"	"	"
No. 3,	"	8.00	"	"	"
No. 4,	"	4.57	"	"	"

It will not be understood, I hope, that I am criticizing the working of the London companies. I use these figures simply because they are at hand. My object is purely to investigate the question asked—viz., "What is the proper amount to allow for the repair and maintenance of a gas company's plant?" It has been repeatedly stated, in Parliamentary inquiries and elsewhere, that 6d. per 1,000 feet is a fair amount; but the system of gauging the expenditure by the ton of coal and per 1,000 feet is manifestly an erroneous one, as a comparison of the figures in the tables show. As an illustration, let us take the case of two companies having the same capital, selling the same quantity of gas, and both spending the same amount for wear and tear. But one company sells 10,000 feet per ton of coal, whereas the other sells only 9,000—a not unusual discrepancy. Now the company making the most of the coal, and therefore using less of it, is made to appear as though they were spending more on their plant than the other; while in reality they are both spending the same amount. The true guide is the percentage on the fixed capital. The proper amount may or may not be 6d. per 1,000 feet sold, but if it only represents about 3¼ per cent. on the capital, it is certainly insufficient. The plant of no manufacturing concern can be expected to be efficiently upheld at less than double this amount; and I consider that the company which spends at the rate of 8 per cent. is under rather than over the proper thing, bearing in mind that it represents not only repairs but renewals, and the maintenance of the property at its original value. In condemning the system of calculating repairs on the ton of coal used, I think I am supported by the facts of the case. I admit there might be instances where it might be preferable, as in the case of a works having changed hands, and where a larger sum has been paid for it than is represented by plant. But in the great majority of cases there can be no doubt the right way is to take the percentage on the fixed capital. It is the works represented by this that we have to uphold; and whether we use a rich coal or a poor one, the wear and tear is the same, to all intents and purposes.

The anxiety we find all over the country to reduce the charge for gas may result in grave difficulties in the future, because they are often accompanied by diminished charges for repairs. This means that the works are just kept going, forgetting that each year is lessening their structural value, in spite of all repairs. Capital is thus lost, and a time will come when it will have to be replaced in some way. Parliament is largely to blame for this state of things; and by giving too ready an ear to those whose duty it is to watch over the interests of the public, it has legislated in such a way as to compel us to spend capital unnecessarily, by withholding from us powers to do that which every manufacturer is bound to do, if he wishes to remain solvent—debit his returns with depreciation on his works. But we are not altogether without a remedy, if we pursue the policy of maintaining our works at the full structural value, by taking from revenue a proper percentage on the fixed capital, irrespective of what it may work out per ton or per 1,000 feet, and save all outlay of capital except for pure increase of business. The company which sells gas cheapest is the one having the least capital in proportion to its business, and not the company which starves the works to make a large profit.

On the subject of increasing the consumption of gas, our discussion today will afford us much information. Next to lowering the price of gas, there is nothing of greater importance to us. How far price is controlled by consumption is an open question. It is common to hear it said that, owing to the increase in the consumption, the price has been reduced; but this is not the whole truth. The day consumption of gas is a most important matter, and it must engage our attention more than hitherto it has done.

Mr. H. Peaty (Burslem) moved a vote of thanks to the President for his address. There had been, he remarked, a tendency of late, in correspondence regarding cheap gas, to overlook some points to which the President had called attention. He supposed there was no discussion on the address, or it might call for some remarks.

Mr. W. Davis (Hereford) seconded the motion, which was carried.

The President acknowledged the compliment, and said he had not tried to make the address a comprehensive one, but to call attention to some subjects which required consideration at the present day.

[From Transactions of American Institute of Mining Engineers.]

The Amount of Oil Remaining in Pennsylvania and New York.

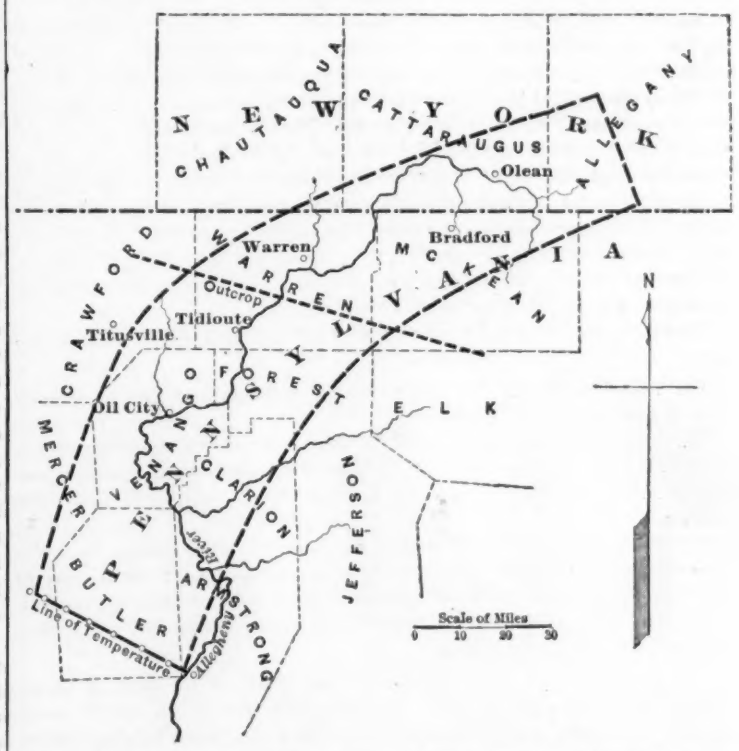
By Henry E. Wrigley, C.E., Phila.

Read at the Washington Meeting, February, 1882.

THE BOUNDARIES OF THE OIL REGION.

The boundaries in the oil region of Pennsylvania and New York, as determined by the drill, embrace a much larger extent of territory than is generally supposed, being nearly 200 miles in length from north to south, with an average width of 25 miles, covering an area, within somewhat irregular lines, of about 4,250 miles.

After twenty years of development we find these lines practically the same as those laid down by McClure in his geological map of the United States, published in 1817, and denominated and colored by him as the "line of salt," which was found in quantity long before petroleum.



The eastern line of the entire oil region lies in a northeast and southwest direction, parallel to and some distance west of the Allegheny Mountains; the south line is substantially one drawn between the southwest corner of Butler County and the town of Kittanning in Armstrong County; the west line passes up through Butler County, cutting off a small corner of Mercer, west of the towns of Franklin, Titusville, and Warren, into New York State, where it rounds off the end of this long strip in the counties of Allegheny and Cattaraugus, and joins the eastern line, near Olean, New York, just north of the city of Bradford. (See map.)

The eastern line, starting from Kittanning, passes through the northeast corner of Clarion County, the southeast corner of Warren, cutting Forest County through the center, and reaching the before-mentioned extreme northeastern developments near Olean. These lines have been taken broadly to include all territory that could ever possibly come into the question as oil producing.

These lines having been proved by the drill may be considered final. But

there are also structural reasons for their existence. The south line is final because the oil-gathering sponge-rock on that line is found at such a depth, owing to the dip of the strata from the northwest, that the known temperature of the earth at that depth precludes the existence of hydrocarbons in any other than a gaseous form. The string of gas wells from Leechburg to South Butler County are brilliant and permanent witnesses to this fact.

The whole of this section of the States was at one time a level plain, the Allegheny Mountains being only waves of upheaval; these waves dying out as they went more and more faintly towards the Ohio line. The vertical fissures left in the strata by these waves of upheaval allowed the gas to come up from the buried shale 20,000 feet below, and condense in the pebble rocks under a solid cap or cover of unbroken rock 1500 feet thick, where the drill tapped it in the form of oil. But where the rolls of the strata were so great that the fissures extended all the way to the surface, the gas came to the surface too, and went off in the air as fast as it was made.

The eastern limit is the line where all the fissures of the anticlinals and synclinals have come to the surface, and a very little research will satisfy one as to the certainty and finality of this line.

The reason for the west line is just the opposite; the waves all died out and there were no fissures at all, so the gas could not come up. This same reason holds good on the north line all the way round to Olean, with this exception, that on the north line the fissures do exist at a greater and greater depth as we go northward; and we can reach them by drill and torpedo if we go deep enough, provided we never exceed the safe depth for temperature of 2,200 to 2,250 feet. We may safely assume that at a red-hot depth under the whole country lies the vast bed of the Huron coal shales, and the question is only one of distillation and outlet; of a conduit to some natural condenser with a strong cover near enough to the surface of the earth to be above the line of temperature, so that we can tap it with the drill. No account is taken of the occurrences of oil from the upper light shales in the shallow wells at Mecca, Ottin, and elsewhere west of this western line, as they are totally unimportant factors in the general problem.

GEOLOGY OF THE OIL REGION.

Assuming the general surface of the country in Western Pennsylvania to be level, a board with its edges due north and south, east and west, tilted up slightly at the upper left-hand corner (representing the city of Erie), will give the general idea of the dip of the strata throughout this section. It will show two dips, one to the east the other to the south; and, as the surface is level, these strata come successively to the surface as we go northward and westward. The oil sands of Butler County, for instance, if projected into the air on the line of their dip, would be 1,000 feet above the level of Lake Erie: so, too, the same third oil sand that we find at Tideoute, at a depth of 100 feet on the river bank, we find at 1,800 feet in Butler County. The oil sands practically end and crop out all across the oil section on the line shown above Tideoute.

Now there are four conditions necessary to the production of oil in quantity:

1st. The oil shale, which exists under the entire region, and far outside of it at a red-hot depth in the earth.

2d. Such vertical fissures, caused by upheavals in this secondary strata, as will allow the gas generated by the heat of the earth from these carbonaceous shales, to escape upward to a point within, say, 2,000 feet of the surface.

2d. Between this point, and within, say, 100 feet of the surface, a cooler reservoir, either of coarse pebble rock or an aggregation of small fissures to receive the gas and condense it, either with or without pressure, into oil.

4th. Over this reservoir there must be a solid cap or cover of rock to confine the products of distillation.

In the entire region south of Tideoute the third or oil sand is traced readily by the record of the wells, and the known dip of the rock of about 20 feet to the mile, the level of the wells, if on a hill, being first taken from some known point.

In the entire region north of Tideoute the reservoirs are simply crevices and have no reference to sands, but the operator, carrying his experience of oil sand with him from below, drills his well down to a certain close gray sandrock as a guide. It is simply because he finds that the general horizon of the termination of the vertical fissures at the upper end occurs in this particular line of strata. The gentleness of the waves of strata at this point, and the insignificance of the dip, account for the general regularity of the sandrock. But great perplexity is often caused by its occasional irregularity.

This entire long oil section of 4,250 miles may therefore be divided into two areas of pebble-rock and fissure territory respectively, with the dividing line of the outcrop of the pebble-rock a little above Tideoute. The oil region may be defined as that portion of western Pennsylvania and New York which, within the boundaries here defined, possesses all the four requisites mentioned for the production of oil in quantity. On the east there is no cover; on the west it is all cover and no crevices within reach of a proper depth of temperature; and on the south the reservoirs are all below the line of temperature.*

THE PRODUCTION OF OIL.

Until January 1st, 1875, the known area of oil territory was 3,115 square miles. This embraced all that part of the oil section described as pebble-rock territory lying south of Tideoute, with but trifling exceptions outside. Up to that time but 39¼ square miles, or about 25,000 acres, of this area had been found to be actual producing territory by the sinking of nearly 11,000 wells.

During the next three years the discovery of fresh fields became more difficult, and as the average life of a well does not exceed two and one-half years, the price of gas steadily increased. This stimulated search to such an extent that before 1879 over 15,000 more wells were put down in all directions, resulting not only in the discovery of 11 more square miles of territory, but in condemning a vast portion of the outside field.

In 1879 Bradford had attained such proportions that its large product thrown on the market discouraged the expensive "wild-catting" and deep sinking of the lower field. Since then there have not been added more than 3½ square miles of actual producing territory, making the total amount in the pebble-rock territory 54 square miles.

From the manner of "feeling one's way" with the drill in developing the lower country, the operator, in defining every five square miles of actual producing territory, condemmed 60 to 100 square miles around him by his test-wells or antenæ, spread out in all directions. I believe this will be accepted as a fair estimate based on experience, and will dispose of at least 800 square miles.

Now as to the boundary lines of the entire oil section, ranging in length much over 400 miles, are all staked out by gas wells, dry holes, and failures, and as the area has been liberally estimated, we may safely draw around these boundaries a cordon of an average width of two miles, and that will dispose of at least 800 miles more.

There is not one particle of the territory south of Tideout and west of the Allegheny river, as far down as Franklin, that has not either been exhausted or condemned for all purposes of quantity, by persistent and unmitigated "wild-catting,." There is only left, on the west side of the Allegheny all the way down below Franklin, a small belt or strip of land, what may be called uncertain land, on the west side of Butler County and the southwest corner of Venango County, not exceeding 180 square miles.

On the east side of the Allegheny, below Oil City, there is only a small area of not more than 40 square miles in the north part of Clarion County and vicinity, which may possibly be oil bearing. There is left on the east side of the Allegheny, north of Oil City, all that part of Forest County lying west of the great east boundary, still a wilderness, containing 350 square miles of uncertain pebble-rock territory, good for shallow wells (in spots, of from 100 to 500 feet deep). There is left also in the interstices, so to speak, of these larger areas, and scattered over them, a number of small uninvestigated producing areas which will, no doubt, be productive later to a small amount.

Anyone who will give the subject candid consideration will not claim 500 square miles of what may be called uncertain territory in the pebble-rock division of the oil section; and the amount of actual oil territory, judging by the results of 20 years in the remaining 2,600 square miles, will not be more than 11 square miles.

The 1,200 square miles of the oil section north of Tideoute, which has been described as crevice territory, must be considered in an entirely different manner. The key to the exact location of the boundary line of the oil section in New York, on its north and west lines, may be found in the following illustration:

The crevice which furnishes the gas in the well at Fredonia, New York, on the lake shore, was found at a depth of 1,500 feet below the bottom of the oil wells near Olean, New York. (See section of oil country in Vol. J, 2d Geol. Survey of Penna.) That is why they find only gas in that section. The crevice reservoirs lie deeper and deeper as the waves of disturbance die out northward and westward, until they pass that point of the line of temperature at which oil can exist as a fluid. This line which I have described as the final north and west boundary, can be readily tested by anyone who will take the record of the wells on the lake shore and the nearest producing wells, and measure off to the point between them that calls for a mean geological horizon of 2,000 feet from the mean gradient of the surface.

For the same reason no well in this section should be considered dry until it has been drilled at least 2,000 feet, and well shot with torpedoes. There are no doubt a number of wells which have been abandoned under the mis-

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* In Vol. J, of the 2d Geological Report of Pennsylvania, fuller details of these points can be found than the limits of this paper will permit.

taken idea of the necessity of reaching a certain sand, and which might have been driven several hundred feet to a good production.

The proportionate area of actual producing territory in the crevice oil section will approach nearly to 40 or 50 per cent. It does not follow that the actual amount of oil obtained is necessarily much greater than in the pebble-rock section, for the wells are scattered more widely apart over large areas, instead of being huddled together over a small bed of sponge-rock in the lower region. Assuming that as much as 600 out of the 1,200 square miles of crevice-rock section will be found to be oil territory in the manner here described, Bradford and the vicinity of Olean have already consumed 230 square miles, well determined and already on their decline. This is a matter of commercial record. The time occupied in this exhaustion is the fastest on record, only a little over two years. Some 80 more square miles of new territory are also now in full operation, around Richburg and elsewhere.

With this simple outline of the oil field, and with the records of actual results, one can readily form an estimate of the amount of oil remaining. There is no necessity for republishing here the detailed tables of statistics of production of oil. The present situation is simply this:

If 54 square miles of the lower actual territory produced, in round numbers, 108 millions of barrels of oil, then the eleven square miles left will give	22,000,000
If 230 square miles of crevice-rock territory produced 46 millions of barrels, then the 370 square miles remaining will give	74,000,000
Total	96,000,000

It is only necessary to add that the present yearly output is over 25 millions of barrels.

CONCLUSION.

There are many minor questions that are necessarily excluded in a concise presentation of this subject, such as the possibility of resuscitating old oil fields; of the imperfection of the surveys of Western Pennsylvania; of the enormous waste and destruction in the early oil developments; of the origin of the oil; of the effect of the denser gravity of the surface water on the oil in the rock, etc.

The thought which the writer desires to present plainly in this paper, which is the result of many years of close observation, is that the oil section has now reached a point of development when the amount of oil remaining can be measured with sufficient accuracy to predict definitely the life of the region. He does not wish to be considered a pessimist; he would be glad to know that he is wrong; but the possession of a check-book is not of itself an evidence of wealth. We have had a certain fixed quantity of oil placed to our credit in the Bank of Nature on which we have been drawing checks for 20 years; in 1875 we were checking out 6 millions, and in 1882 we are checking out 25 millions annually. Some day the check will come back indorsed "No funds;" and we are approaching that day very fast.

A Chimerical Scheme.

The public, or at least that portion of it which lived in the last generation, will recall the scheme of a thrifty Yankee who proposed to utilize the waterfall at Niagara by placing under it a huge water wheel. The practical Yankee aforesaid proposed to run a huge shaft through the State, and to permit all manufacturers who would pay for the privilege to "belt on," as he expressed it. The scheme, in the opinion of the Yankee, was a noble one; but somehow or other it didn't work. The money that was required to construct the mammoth wheel was not forthcoming, and the visionary Yankee was forced to give up his grand plan, and to view the immense waste of water at Niagara with regretful eyes.

But the seed planted by the Yankee whose gigantic mind first conceived the astounding plan of utilizing the waters of Niagara in the manner above described fell in good places, and in this enlightened generation it has blossomed forth, ready to bear fruit. It remains for a citizen of Rochester to revive the attempt to utilize the rushing waters of Niagara, and the manner in which he proposes to accomplish this result is briefly as follows:

The denizen of the Flour City claims to have an agreement for the sale to him and those associated with him, of Prospect Park, at the Falls, for $1,000,000, and to possess some mysterious inventions for generating electricity by this enormous hydraulic force, estimated at 2,000,000 horse power; and he states that the electricity will be conveyed through 1,000 miles of properly insulated cables to sixty-five prominent cities and towns between Boston and Chicago.

The visionary citizen of Rochester who is responsible for this gigantic scheme has been down to see Mr. Edison in regard to it. The great inventor smiled sarcastically after listening to the plans of the gentleman from Rochester, and then politely told him that it was evident that he didn't know what he was talking about. Mr. Edison declares that it might be a commercial success to take the power from the Falls to Buffalo, and that it is scientifically possible, if a 10-horse power engine be placed at the Falls, to transmit a force of 9.9-horse power to New Orleans; but looking at the practical working, the thing is an absurdity. To carry electricity a long distance there must be cables, and at such an expense that it would not pay; it would be very much cheaper to depend upon the local power of steam engines. One great obstacle to the success of the Rochester gentleman's scheme is the question of cost. The gentleman proposes to have 10,000 miles of cable. The Atlantic cable cost $1,500 a mile. On this basis there is an item of $15,000,000 for cables alone. Mr. Edison concluded that the Rochester gentleman is a wild talker, and that his scheme is really too impracticable and absurd to be taken seriously.

Nothing daunted by the envious conclusions of Mr. Edison and other electricians, the Rochester gentleman has been vigorously seeking to enlist capital in New York to enable him to carry out his grand plan. We are sorry to be compelled to conclude that he has not yet succeeded in finding any capitalists in New York so utterly overburdened with wealth as to think seriously of going into this scheme. It is now announced that failing to meet with proper encouragement in the metropolis, the Rochester gentleman has moved on to Boston, where he hopes to find a sufficient number of gentlemen of culture and means who will appreciate his desire to benefit mankind to the extent of affording him an opportunity of putting his scheme into practical operation.

So let the good people of Rochester live in hope; who knows but that the city that gave birth to Sam Patch, Seth Green, and the Powers Block may yet give to the world the man who will succeed in turning the mighty waters of Niagara into practical account.—Syracuse *Daily Courier*.

[From the London "Journal of Gas Lighting."]

Burners and Various Gas Apparatus in Use for Domestic and Other Purposes.

At the conclusion of the paper read by Mr. West on the above subject, at a special meeting of the Manchester District Institution of Gas Engineers, and which appeared in the last number of the AMERICAN GAS LIGHT JOURNAL, the following discussion took place:

Mr. Hulme asked for some explanation of the tables contained in the paper.

Mr. West said it would be seen that the defective burners only gave a light equal to 2.28 candles for every foot of gas consumed, while the Siemens regenerative burner gave a light of 5.3, 5.8, and 5.85 candles. The same thing was observable, in a less degree, in the case of the superior kinds of small burners. In reply to further questions, he added that the old triple cockspur burner which he exhibited gave the worst result—2.48 candles per cubic foot. Sugg's 50-candle burner gave 4.97 candles, or more than double. He had not included the ordinary Argand burner in the tables; but from previous tests he might say they came out very badly. They were formerly all made with iron tips, and would be not quite so defective as the other old burners, but nearly so. In the improved Argands a great increase would be noticed in the illumination by the heating of the air, as in the Siemens burners. Reading from the tables the result of Mr. T. W. Keates's experiments with the regenerative burners, he pointed out that these were made with gas of 15.4 candles, while those which he (Mr. West) had made with other burners were with gas of 20 candle power. If the Siemens burners were tested with Manchester gas, the results would be much better, and a higher illuminating power than was represented in the table would be obtained.

Mr. Olney said he had been much engaged in connection with lighthouses, and was astonished that gas engineers had not found some means of introducing gas into them. There were, he knew, two difficulties in the way—one, especially, that lighthouses were for the most part situated in positions where gas was not obtainable; and, secondly, the illuminating power of gas was not equal to oil, so far as the possession of carbon was concerned. Some years ago a firm with which he was connected entered into the question of introducing an extra supply of carbon into coal gas. They used several of the hydrocarbons, and found they could introduce an increased supply of carbon, but in cold weather it frequently settled in the mains. This was twenty years ago, and those who were connected with gas manufacture would probably be able now to find some means to secure the permanent retention of this increased supply of carbon. It could be communicated to atmospheric air, and he saw no reason why it should not be retained in hydrocarbon gas. If they would give this matter their consideration he was sure gas could be introduced in lighthouses. Electric light was much talked about, but he must confess that, from his knowledge of the subject, and the experience he had had of it, he had not much faith in

it. In the first place it was costly; and, in the second, it had small penetrating power in thick weather. In this light the red color, which could alone penetrate a dense atmosphere, was overridden by other colors, so that its brilliancy on ordinary occasions was no proof of its real illuminating and penetrating power when most required. Some few months ago the Board of trade sent out circulars asking the opinion of certain foreign authorities as to the use of the electric light in lighthouses. In most instances the persons applied to were disgusted with the light, because in clear weather it was too powerful—blinding, in fact—while in dark weather it could not be seen at all. In thick and foggy weather an oil light of 750-candle power could be seen further than a 4,000-candle power electric light. The difference between the cost of the two was very great, and the superiority of the oil light arose from the fact that there was in it, as he had already explained, a great amount of carbon which gave off red rays, while the luminous rays of the electric light had no penetrating power. He hoped gas engineers would give this matter their attention. He would not go into the question of gas stoves, but should like to call attention to a little article in the exhibition designed to prevent explosions owing to the escape of gas from taps not being properly turned off.

Mr. West produced a sample of the Hon. J. W. Plunket's safety gas taps and explained the method on which it acted.

The Hon. J. W. Plunket said the apparatus had been constructed in a great hurry, but he believed there was something to be made out of it, and he left it to men like gas engineers, who were able to deal with the matter from a practical and scientific point of view, to develop the idea.

Mr. W. R. E. Coles (Hon. Sec. to the Smoke Abatement Exhibition held at South Kensington) stated that he had received a letter from Mr. J. O. Phillips, the Secretary of the Gas Light and Coke Company, announcing that the Company were prepared to lend on hire gas stoves of approved manufacture in order to encourage the use of gas for cooking and heating purposes. He mentioned this because it had been stated by Mr. West that this plan was adopted by some gas companies and corporations, and was a means of inducing the public to employ gas for these purposes, and because its more general adoption would further the end he had in view.

Mr. Taylor said he was sure all present were much interested in the paper, one portion of which—that referring to gas cooking—came home to them all. He asked whether he correctly understood Mr. West to say he was not in favor of atmospheric or Bunsen burners.

Mr. Carr (Halifax) said he was glad to avail himself of the opportunity of making a few remarks on the paper, for the reason that gas managers did not often get an opportunity like this of speaking to gas consumers. He wished to warn them against adopting everything that was new, with the idea that it must be good. A great deal of discretion was required to be exercised by consumers in the selection of their burners and other apparatus. Mr. West touched upon the question of globes. It was only very recently that anything like a good globe had been brought out, and if gas consumers had bad globes they would find they could not get the effect with good burners which they otherwise would. Certain conditions must be observed if they wished to get the maximum illuminating power of the gas. The illustration which had been given with reference to the Siemens burner was admirable, as showing what good conditions would do in the way of producing a good light from a small quantity of gas with a good burner. The object to be attained was to heat the carbon to a white heat, and to keep it suspended in this condition as long as possible. In the ordinary burner the gas had to travel a certain distance before it became luminous, but in the Siemens burner both the air and the gas were heated, and the result was little blue in the flame. As to gas engines, he should like all gas consumers who used power at all, or were likely to do so, to carefully consider whether it would not be wise to use gas instead of steam. Personally he believed, from the experiments which had been made, that it would be a great advantage to use gas. He had pleasure in moving a vote of thanks to Mr. West for his excellent paper.

Mr. Greville Williams, F.R.S., seconded the motion, and said the contrast of the two rows of good and bad burners with which Mr. West had illustrated his paper was one of the most instructive things he had seen.

Mr. Eastwood (Batley), in supporting the motion, said a matter of essential importance in connection with close gas stoves was that the supply of air should be heated before it entered the stove. No doubt the advantage gained in cooking the dinner that day was due to the fact that waste heat was used in heating the supply of air going into the stove; and if other gas stove makers would try to adopt this principle, very likely they would obtain a higher sale than they had hitherto done. There was also a point to which he wished to draw the attention of gas committees—namely, the price of gas for cooking, heating, and mechanical purposes. Those who were in the habit of reading the *Journal of Gas Lighting* would have seen that their friend, Mr. Henry Woodall, of Leeds, had made an important proposition—that they should encourage the day consumption of gas for cooking and heating purposes, and as a motive power, by charging a lower price for it. If they charged 2s. 5d. per 1,000 feet for gas for lighting purposes, 1s. 5d. of it was for interest on capital; consequently the gas cost 1s. per 1,000 feet. If they could manage to sell gas for other than lighting purposes they utilized their plant, and if it were sold at a little above the cost price, every penny of this would go practically to reduce the price of gas for lighting purposes. They had the interest to pay, whether the consumption was great or small; and as it was manifestly to their interest to extend the consumption, he should like every gas engineer and the members of every gas committee to give the question due consideration. If they reduced the price of gas sufficiently low they would have consumers; it was only the high price of the gas that prevented gas stoves being extensively used.

Mr. Mark (Manchester) asked for information as to the effect of the gas vapors on meat cooked in gas ovens, and also wished to know whether the extinguishing of say 20 out of 30 burners would affect the index of the meter. The result on some of the burners would be that they would roar, while others would not; and he wanted to know whether the registration of the meter would be in exact proportion.

Mr. Travers (Cork) said there were some very good stoves in the exhibition; but he could only repeat the remark he made on a former occasion, that they were yet far below the mark. Recently he spent some time with Mr. Fletcher, at Warrington, and the result of experiments on that occasion brought out this fact very clearly, and if they were to promote the use of gas for cooking they must certainly have better stoves. Many of the gas stoves in the exhibition did not represent one-third of the heating power. Perhaps, however, he should correct himself by saying not the stoves in the exhibition, but of those generally in use, of which he had made trials. Another matter was that if gas companies were to promote the extensive use of gas cooking stoves, they must not be content to lend them on hire. From long experience he thought it would be better policy to supply stoves for nothing, in the same way that they now supplied meters. Another point was that if they gave stoves they must teach the people how to use them. They must study to show them how to produce the highest results from the smallest quantity of gas, and he certainly did think there had been more failures under this head than under any other in connection with gas cooking stoves. The three points on which he wished to insist were that they wanted still better stoves, they needed to supply them for nothing, and they must teach the people how to use them.

The President, in putting the motion, observed that the paper had been most interesting, and would, he hoped, prove of permanent advantage to those who had had the pleasure of listening to it. There was no question that there was very considerable waste in the use of gas, and that a great saving might be effected.

The motion was carried with applause.

Mr. West, in reply, said he was very much obliged to the meeting for the kind attention they had given to his paper. He was sure that if he could only be the means of imparting to consumers information upon the proper economical consumption of gas, whereby they could save a little money and put it in their pockets, he should be very pleased There were two or three matters brought up in the discussion which he should like to touch upon. Mr. Olney desired him to point out the advantage of one kind of burner over another. He was very glad that this opportunity had been given him, because he had been remiss in that matter. The same gentleman had drawn their attention to the question of lighthouses, and the lighting of them so as to guide the mariner. The great difficulty had been in producing from gas a light of sufficient intensity. Mr. Olney had himself pointed out what was necessary; because in all luminous gas flames the richer they were in carbon the smaller they were. What he suggested was that they should have gas that was rich in carbon. The object was to get a small volume of light, so that the lenses could direct the rays across the the water. He (Mr. West) thought this might probably be done by using the very richest cannels; and perhaps, in addition, some petroleum spirits. Mr. Douglass, of the Trinity House, had done a great deal in this direction with his burner, and, from his knowledge of lighthouses and his acquaintance with oil lamps, had been able to produce a burner which they were all glad he had brought into use. As to the red rays, and the advantage of gas and oil over electricity, he did not propose to say much, because he did not consider they were in opposition to the electric light. It had probably imparted to them a little stimulus in their business, and perhaps given some impetus to their endeavors to make gas a little more cheaply, which, regarded from one point of view, must be an advantage to the public. For his part he did not fear the electric light. It would have its place, no doubt, but he did not think gas was going to be very readily displaced by it as a public illuminant. Mr. Mark had asked what would be the effect upon meat which was cooked by gas. His idea, he (Mr. West) supposed, was that the meat might be tainted by the volume of vapor that passed over it, the result of the combustion of the gas and the steam arising from the meat itself. As was explained in the paper, a stove, to be efficient.

should be a ventilated stove—a current of air should pass from it; but even if this were not the case—if it were a closed stove—he did not think there would be any fear of the meat being affected, as the juices and gravy would be driven to the center. The best way of cooking by gas was to turn the gas on full in the first instance, so as to form a sort of film on the outer surface of the meat. At a large hospital with which he was acquainted in the South of England, about 15 cwt. of meat was cooked every day by means of gas stoves, and it was proved that the meat contained more gravy and was more delicious than if cooked in the ordinary way before a fire. This question was, in fact, settled by Mr. Sharp, to whom he had referred in his paper, forty years ago. At that time meat cooked by gas and before an ordinary fire was placed before persons who were not informed of the means employed, and the universal decision was that that cooked by gas was the better. Mr. Mark also asked if, assuming that there were 50 lights attached to one meter, and 30 of them were suddenly extinguished, there would be any effect upon the quantity of gas registered by the meter, and whether it would be in proportion to the number of lights burning. This depended upon two things. In the first place, all the burners should be of the same size, and then if 30 of them were shut off, unless one of the excellent governors which were in the market were employed, an extra pressure would be the result, and a larger volumn of gas would force itself to the point of issue, and more would be consumed. It came to this, that if they wished to reduce their gas bills they must, under the circumstances alluded to, either reduce the supply to the meter or have small governors or larger regulators. Assuming that these conditions were carried out, the gas consumed would be reduced in proportion to the number of lights turned off. Mr. Travers, who had studied the question very closely, was anxious to have gas stoves largely used, not only in Cork but elsewhere. He objected, however, to the low results obtained. They were aware that the thermal power of gas was from 16 to 17 units, and that nothing like this heating power could be obtained from the stoves; but he did not think he was giving the manufacturers of the stoves full credit when he said they could only get one third of this power from them. The object of the exhibition was to test points like this, and he would suggest that much good would result if experiments could be made on a large and extensive scale for the benefit of gas consumers who suffered from these inefficient stoves. He hoped those who had organized the exhibition would use all the means in their power to get gentlemen to test these things, so that the best stoves might maintain a position in the market. A gentleman in the exhibition the other day called the Secretary's attention to the fact that there were no boilers there heated by gas. It was not a fact, however, that there were none in existence, for years ago Mr. Goddard, of Ipswich, made one which heated the water with great success. He (Mr. West) was not there to advocate the use of gas for all purposes. The conditions of each district must be taken into consideration, and in some cases it would be found that gas for cooking, heating, and as a motive power would be more economical than solid fuel possibly could be.

The proceedings then closed.

Report of the Portland (Me.) Gas Light Company.

The following report of the operations of the Portland Gas Light Company, for past year, is taken from the Portland (Me.) *Advertiser*, of May 17, 1882—

The annual meeting of the stockholders of the Portland Gas Light Company was held at the office of the Treasurer May 17, 1882, at 3 o'clock.

The President, E. H. Daveis, reported as follows:

The consumption of gas for the year ending April 30, 1882, was 47,121,000 feet—an increase of 3,141,000 over the preceding year. 4,318½ tons of coal were used, and 32½ tons of oil, yielding 49,000,000 feet of gas—about five feet per pound, and of the average quality of 17.6 candle power.

The loss from condensation and leakage was about 7¼ per cent. There were sold 86,000 bushels of coke—an increase of 14,000 bushels over the preceding year. The number of consumers on May 1, 1882, was 2,695—an increase of 97. The number of street lanters is 454—an increase of two.

The Renewal Fund of the Company has been increasing for many years at compound interest, until it amounts to about $187,000. Owing to our fortunate exemption from the disasters incident to our business, and to the skill of our engineer, Mr. Yorke, the cost of renewals of all kinds, since 1868, has been much less than it has been thought prudent to provide for by semi-annual appropriations. This was especially the case in regard to the proposed construction of a new gasholder, in place of the one built in 1859, which broke down within ten years after, and was condemned by experts as not capable of repair. By well-judged appliances, Mr. Yorke has kept the upper section in use until the present time, although we have been expecting from year to year to build a new one; and it now seems probable that this will answer our purposes a number of years longer.

The Treasurer has taken good care of the fund, keeping it drawing interest and investing from time to time in securities that have steadily appreciated, especially for the past 8 or 10 years, and has not lost a dollar. The immediate inducement to making a division of so much of this fund among the stockholders is the urgent request of the Mayor, who has addressed to us the following communication:

"The city has unusual burdens to carry this year, on account of the refusal of the Grand Trunk Railway Company to pay the interest on the bonds issued in extension of the city loan to said Railroad. It seems to me very important that the rate of taxation should not be increased, which must be the case unless appropriations are cut down, or the city's income in some way increased. It would aid the city in meeting this difficulty if its income could be increased by an extra dividend on the stock it holds in your Company. I understand there is a surplus fund from which such a dividend could be made, and trust the matter will receive your favorable consideration."

After careful consideration, the directors have concluded to comply with the request of the Mayor, and a special dividend of $25 a share has accordingly been declared, payable on and after July 2 next, at the Company's office, to stockholders of May 1 current.

The report of the Treasurer will show the receipts and expenditures of the year.

The Treasurer, James T. McCobb, Esq., reports the receipts from all sources as $126,407.63, and the expenditures, including two dividends, as $124,578.11.

After the reading of the reports, the old Board of Directors was re-elected, viz.: E. H. Davis, Thomas Cummings, Ezra Carter, Charles B. Merrill, William W. Thomas, Jr., Samuel Rolfe.

The Board re elected E. H. Daveis, Esq., President, and Jas. T. McCobb, Esq., Treasurer.

Honest Journalism.

Our esteemed contemporary, *Iron*, of London, thus "goes for" some of its American cousins, and we regret to say that there is much truth in its complaint:

"It is not too soon, nor for the first time, that an American contemporary, which is both ably and honestly conducted, and enjoys in consequence a reputation in accordance with its merits, calls attention to a matter which in the first place concerns itself, but which equally nearly touches the interest of other newspapers. The Boston *Journal of Commerce* rightly complains of the audaciously free use made of its columns by certain filibusters of the press. It is no doubt highly gratifying to an editor to have matter which appears in his journal reproduced by other papers, but it is mortifying to find that this act is not accompanied by the acknowledgement which motives of fair dealing alone would suggest to the appropriators of original articles. Our contemporary, we are afraid, is not the only sufferer from this organized robbery practiced upon the brains of other people. We are sorry to say that, speaking from our own experience, American journals more particularly are very great sinners in this respect, though English Journalists are not immaculate. We know of two such robbers on the other side of the Atlantic. One of them, a hardened offender, 'lifts' matter appearing in our columns systematically, without ever indicating the source whence it is derived. The other does so occasionally. A very laughable instance occurred quite recently, when the latter copied, without acknowledgement, the first portion of an article of ours—for which, by-the-bye, we paid hard cash—omitting to reproduce the second portion, which appeared in a subsequent issue of *Iron*, and which happened to be the more valuable of the two. Was it a sense of shame which prevented the act of dishonesty being repeated? We leave this little affair of honor to be settled by the culprit, who, no doubt, will catch sight of this reminder to his conscience.

"Speaking candidly, it matters but little to us whether nefarious use is made of articles appearing in these columns. Even the thief by his dishonest act helps to disseminate information which may be useful in some quarters. But we may just call to his mind the old adage, that 'honesty is the best policy.' American papers, please copy."

One Meter which Cheated a Gas Company.

John Flieg is a Frenchman, thirty years of age, and the proprietor of a hotel in 155th street, near 8th avenue, which is supplied with gas by the Harlem Gas Light Company. On the 17th of February last Flieg's meter was replaced by a new one, and, it is said, was found to have been tampered with. On the 15th inst. the new meter was found by the Company's inspector, James Owens, to have a hole drilled through the drip-screw, on the outlet side of the meter and through both sides of the partition, which

allowed the gas to escape to the supply-pipe without being measured. The American Meter Company also made an examination and reported the same state of affairs, and further that for every 126 feet of gas used 26 feet were not registered, and consequently not paid for. A warrant was then procured upon which Flieg was arrested and brought before Justice Murray in the Yorkville Police Court to-day. He said he knew nothing about the matter, and was held in $500 bail to answer.—New York *Evening Post*, May 17.

[Official Report.]

Fifth Annual Meeting of the Western Gas Association.

Held at the Grand Pacific Hotel, Chicago, Ills., May 10, 11 and 12.

The Association was called to order at eleven o'clock, A.M., by the President, Mr. Thomas Butterworth. In the absence of the Secretary and Treasurer, Mr. L. A. Hall, Mr. E. J. King was appointed Secretary *pro tem.*

Mr. Burtis offered a motion, which was unanimously carried, that if there were any "gas men" present, who were not members of the Association, they should be introduced and invited to take part in the discussions of the meeting.

Messrs. John Gimper, J. B. Howard, and C. H. Raynor, the Committee on Application appointed by the President, reported the following names for active membership:

Willard Parritt, Bloomington, Ills.; W. E. Seip, Eau Claire, Wis.; C. R. Faben, Milwaukee, Wis.; D. Henning, Chicago, Ills.; T. T. F. Remner, Freeport, Ills.; and for honorary membership—

Messrs. H. D. Wagner, Chicago, Ills.; E. Stein, Sterling, Ills.; and Wm. Stacey, Cincinnati, Ohio.

On motion the Secretary was instructed to cast the ballot of the Association for the gentlemen named, and they were declared duly elected to membership.

The Committee on Application also recommended that the name of A. D. Cressler be changed from honorary to active membership, which, upon motion, was done.

The President then read the following address:

President's Address.

Gentlemen, Members of the Western Gas Association—

This our Fifth Annual Meeting brings us together once more to compare notes and mutually give and take such information as we individually may have learned in our respective branches of gas management.

The year just past has been more than usually successful to all well managed gas undertakings. On every hand we hear the same report—increased sales and a demand for extension in both manufacturing and distributing. So much has this been the case in some cities that the engineer in charge has no time to devote to any purpose but designing and erecting new plant.

Now, what has led to all this? There must be some reasons other than the natural increase of population and improvement in trade.

I think our annual meetings of this and kindred societies have added more than a widow's mite, from the fact that "A chiel's amang us takin' notes, an' faith he prents 'em"; also when five or six of us sit down socially after our business meetings and tell our little troubles in the past year to each other—that is when we get our returns in the shape of information that we could obtain from no other source; and the very kind of information that enables us to reduce expenses and by so doing lower the selling price of our specialty.

Another thing that has largely helped to bring about our present prosperity is the suggestions thrown out at meetings by such men as Bray, Sugg, the Siemens Brothers, our own Munzinger and Goodwin, and a hundred others who have spent a large amount of time and money in developing their special inventions for the more scientific consumption of gas.

It is true that these men have mostly had the object of money-making in view, but at the same time they were doing their best to develop the use of gas in their respective lines of trade; and we, as gas managers, are under great obligations to them, one and all.

Their actions ought to stimulate us to cut off expense at every possible corner, and reduce the selling price of gas to the lowest cent that will allow a fair rate of dividend. By so doing we shall help the consumers and at the same time help ourselves.

These men each in their respective lines of trade, have so developed the use of gas in a scientific manner that it has now become a common workshop tool, as much so as the lathe, the drill or the anvil.

We can now buy at reasonable rates gas stoves that will broil a beefsteak without the use of butter better than by the use of a coal fire with butter, and the gas-broiled steak will weigh enough more (there being less shrinkage) to pay for the gas used to broil it.

So also with gas engines. There are now in the market and at work gas engines developing an indicated horse power for 50 per cent. less coal than the best type of steam engines. Lamps and burners are now furnished to our hands, giving a light equal to four standard candles for each cubic foot of gas consumed from sixteen candle gas.

It is useless for me to go over all the different ways of scrubbing and condensing gas, as most of you are better informed on the subject than I am.

My object in bringing this question before you for discussion to-day is to learn something, as I am about remodeling the scrubbing and washing machine at our works.

I pulled down and threw out of action some eight years ago a very efficient washer, as at that time washing gas was not fashionable.

Now we seem to be going over the same beaten ground again. Are we really progressing in the washing of gas?

Our residuals—coke and tar—continue to bring improved returns. Ammoniacal liquors are looking up in price, so much so that we in the West may yet be able to realize some of the good returns for the so-called impurity in coal gas that our Eastern and European friends have had so far all to themselves.

I am credibly informed that some of our English brethren are so taking care of the sulphur impurities as to realize from them the cost of labor in purification.

Now in Illinois alone we have 50,000 square miles of gas coal formations, capable of turning out 7,000 tons to the acre, and each ton containing nearly five per cent. of sulphur. When we gas men take out that sulphur in a merchantable form, and some of us will yet find out how to do it, then by what name will we be known?

Will it be gas men, sulphur extractors, tar and coke distillers, managers of sulphate works, or shall we be known as manufacturers of some one of the coal tar dyes that our friend Page names by the hundreds?

When these and other forms of impurities become sources of revenue—and they surely will in the near future—what, then, will be the selling price of good sixteen candle standard coal gas?

If it is not given away it will be sold at a nominal sum—less than $1 per 1,000 cubic feet.

The fifth and last subject on the list for discussion is electric light.

Our worthy Secretary had it printed, "What effect has electric lighting had on the general consumption of gas?"

I would say that electric lighting is the best friend that gas men ever had.

At our annual meeting three years ago, held at the Tremont House in this city, I made the statement that gas men had nothing to fear from electric lighting. I am still of the same opinion. All the real advance in electric lighting outside of the Jablochkoff candle made since 1848 is due to the invention of the Sprengel vacuum pump and the advance made by our engine builders in producing a better class of steam and gas engines.

Beyond this, all is speculation in what is yet to be done—brought to the front at the present time by the large amount of surplus wealth seeking investment and the insatiable desire to get rich without labor. Indeed, this same thing has occurred more than once before. Let me just read an extract of one of the many good things said of electric light from 1848 to 1850.

The Editor of the *Mechanics' Magazine* says—

"The public have experienced so many disappointments respecting the light, it has been so often represented as attended with perfect success, without that perfect success ever leading to its practical adoption anywhere, that people have fairly enough begun to regard with exceeding incredulity any announcement respecting it. We do not hesitate nevertheless to present to our readers an account of one exhibition more, which has been communicated to us by a correspondent on whose judgment and impartiality we place great reliance, for it does appear from it that all the difficulties of the case have at length been really surmounted, and an actual electric lamp produced which gives a steady, enduring and most brilliant light, without any perceptible flickering or intermission. On Monday last there was an exhibition at Crosby Hall of Mr. Staite's electric light, which demonstrated more decisively than has ever yet been done, the capability of its application to domestic and public illuminating purposes. Mr. Staite made use of a regulating magnet on the plan fully described in the *Mechanics' Magazine*, Vol. 50, p. 48, and most admirably did it perform its functions.

"In addition to the advantage of being self-acting, this apparatus is so sensitive of the slightest variation in the electric current, and so instantaneous in its controlling action, that no unsteadiness of light is perceptible. Mr. Staite also exhibited a small iridium lamp in which the illuminating medium is composed, as the name indicates, of iridium, and which appeared to be particularly applicable to domestic and other purposes, where a very powerful light is not required, but one that will last long without attention, and be of little cost.

"Another lamp, in which carbon points were employed for producing the

light, was subsequently exhibited, and certainly for steadiness and brilliancy it surpassed every other artificial light—so powerful indeed that the eye could not look upon it without being painfully fatigued. To counteract this to some extent, it was enclosed in an enameled globe of about twenty-four inches diameter, which appeared as an enormous globe of pure and brilliant white light. There can be little doubt that ere long we shall see gas and oil lighting, with all their attendant evils of blacks, heat, etc., replaced, at least in all large buildings and public thoroughfares, by the electric light."

This is from the London *Family Herald*, of 1850, and still we live. But the present revival of electric light speculations has had the effect of stimulating the use of gaslight by educating the people to be willing to pay for better street lighting.

We hear no more of the cutting down of the size of street lamps burners from five to three feet, and, in some instances, to one and one-half cubic feet per hour, but, quite the contrary, it is now the fashion to call for larger lamps and improved burners.

The demand on every hand has been for more gas, so that more than one gas company has in the past two years increased its capacity to turn out daily more candle power for lighting purposes than all the electric lights now in existence.

So I claim electric light as a friend of gas lighting, and when in the future (as electric light men claim) it is furnished cheaper than daylight, I expect to be one of those who will be hunting up parties who will burn gas free of cost to enable me to manufacture it for the residuals alone, out of which to sell electric light men their carbon points and insulators; also to get coal tar, out of which to manufacture and sell printer's ink, lampblack, madder dyes, Prussian blue—and, some of our chemists tell us, there is quinine, if we only "go for it."

Some of these things are now accomplished, and the goods now for sale on the market. The others will come in good time. May we all live to see it is the earnest wish of yours truly.

The President then appointed the following committees:

To Report on the President's Address—Messrs. T. G. Lansden, St. Louis, Mo.; Wm. Dunbar, New Albany, Ind.; C. Collins, Cairo, Ills.

On Nomination of Officers for the Ensuing Year—Messrs. Thos. Smith, Grand Rapids, Mich.; J. W. Butman, Decatur, Ills.; A. P. Averill, Cedar Rapids, Iowa.

On Selecting next Place of Meeting—Messrs. Wm. Dunbar; C. H. Raynor, Adrian, Mich.; John Gimper, Leavenworth, Kan.

On Subjects for Discussion—Messrs. C. R. Faben, Milwaukee, Wis.; G. Ramsdell, Vincennes, Ind.; P. T. Burtis, Chicago, Ills.; T. G. Lansden, St. Louis, Mo.; J. B. Howard, Dubuque, Iowa.

Messrs. A. T. Averill and A. W. Littleton were also appointed as a committee for the inspection of the books of the Secretary and Treasurer.

The President then called for a report from the committee appointed last year, Messrs. Sylvester Watts, T. G. Lansden and J. B. Howard to take into consideration the expediency of offering a prize of sufficient value to stimulate inventors into producing a cheaper and better gas engine than has yet been put upon the market.

Mr. Howard, on behalf of the committee, reported that they had not taken any decided steps in the matter for the reason that the present urgent demand for gas engines was strong enough in itself to bring about the consummation so devoutly wished for; that although the prices of the best engines at present in use seem unnecessarily high, the manufacturers are far behindhand in filling their orders, and that the mere knowledge of this fact would do more than anything else towards encouraging the invention of something better than we already possessed. He, therefore, asked for the discharge of the committee; but, after some discussion, action was postponed until the following day, when the arrival of Mr. Watts, its chairman, was expected.

The Association then took a recess until two o'clock, P.M.

AFTERNOON SESSION.—MAY 10.

The Secretary read the following communication:

CRANE BROS. MANUFACTURING CO.,
CHICAGO, ILL., May 10.

Western Association of Gas Engineers:

Gentlemen.—A cordial invitation is extended you to visit the new pipe mill of the Crane Bros. Manufacturing Company, and to make a tour of the city. Carriages will be furnished at such time and place as may suit your convenience.

Respectfully,
R. T. CRANE, Pres.

On motion of Mr. Moran the invitation was duly accepted.

The committee on the President's address reported as follows:

We, the undersigned committee to whom was referred the President's address, respectfully report that the subjects recommended in the circulars sent to the different members of the Association be the subjects to be discussed at this meeting; also that the address be received and placed on file, and that the thanks of the Association be tendered our President for the many good points contained therein.

Respectfully submitted,
T. G. LANSDEN.
C. COLLINS.
WM. DUNBAR.

On motion of Mr. Smith the report of the committee was accepted.

Mr. Dunbar, chairman of the committee appointed for selecting the place for the next meeting, asked for further time in which to report, and his request was duly granted.

The committee on the examination of the books of the Treasurer reported as follows:

Receipts.

To cash balance, May 10, 1881	$76.95
Initiation fees	75.00
Dues	99.00
	$250.95

Disbursements.

Paid on vouchers	$54.73
Secretary's salary	75.00
Stenographic report	60.00
Balance in Treasurer's hands	61.22
	$250.95

Respectfully submitted,
A. P. AVERILL.
A. W. LITTLETON.

On motion the report was accepted and placed on file.

The committee on nominations reported as follows:

Your committee would respectfully report the following nominations of officers for the ensuing year:

For President, J, B. Howard, Dubuque, Ia.

For First Vice-President, Thos. G. Lansden, St. Louis, Mo.

For Second Vice-President, Wm. Dunbar, New Albany, Ind.

For Secretary and Treasurer, Aug. W. Littleton, Quincy, Ill.

For Directors.—P. T. Burtis, Chicago, Ill.; John Gimper, Leavenworth, Kan.; Geo. G. Ramsdell, Vincennes, Ind.; C. H. Raynor, Adrian, Mich.; H. E. Clark, Kansas City, Mo.; R. A. Dittman, Ohio; Frank Beck, Galveston, Texas.

Respectfully submitted,
THOS. SMITH.
J. W. BUTMAN.
A. T. AVERILL.

Mr. Howard.—I certainly think, gentlemen, that there must be some mistake in regard to the selection of that first name for President. In fact, I am sure there must be. I know there are members present who are older and better qualified to hold the position than I, and I hope the committee will make another selection.

A motion to accept the report of the committee was made and carried unanimously.

Mr. Howard was then called for and spoke as follows:

Gentlemen of the Association, I thank you for this distinguished honor. It was entirely unexpected, I can assure you. Although I question the wisdom of your choice, I hope that the confidence you have seen fit to repose in me, will not be misplaced. I shall certainly try to do the best I can, and endeavor in every way possible to promote the interests of our Association. With the assistance of our Secretary we can no doubt make our meetings as large, successful and profitable as any in the country. Again I say, gentlemen, I sincerely thank you.

The committee on subjects for discussion announced their willingness to accept as their own report that made by the committee on the President's address, and adopt as the subjects for debate those named in the circular sent to all the members, viz.:

1. Gas as a fuel for domestic, mechanical and other purposes.

2. Hot scrubbing—what if any are its advantages, and how will gas scrubbed while hot be affected by condensation and scrubbing by the ordinary process.

3. *Condensation*—Which is the most effective and economical plan?—the system of atomizing and forcing the gas to part with the heavy particles of tar by impinging on plates or discs, or by the system of large condensing surface and slow travel, thereby allowing the tar to spread from the gas by its own specific gravity?

4. *Residuals*—Coke, tar, ammoniacal liquor, etc.—What progress are we making and what remains to be done to reduce them to their most profitable and merchantable form?

5. What effect has electric light had on the general consumption of gas?

On motion the report of the committee was accepted.

[To be Continued.]

Electric Light Danger.

The city authorities should take immediate steps to stop the stringing of any more electric wires for light until somebody inspects the way they are put up who knows enough about them to ensure safety from fires and dangerous electrical shocks. The Quackenbush corner was twice on fire last week from the electric light wires, and but for the fact that this occurred early in the evening the whole building might have been destroyed by fire. A hundred telephone wires were thrown out of working condition by this failure of proper insulation. On Saturday wires were strung from a tree in front of Breese's saloon to the top of that building, to light up the Sinsabaugh restaurant, now kept by Mr. Wright, on Third street. The front of Breese's saloon adjoining is of sheet iron, and owing to the defective way in which the wires were strung, the whole front of the building was heavily charged with electricity escaping from the wires The wire grounded on the metallic gutter of Breese's saloon, and thus allowed the electricity to escape. The sidewalk was crowded with boys and men, and those passing by were requested to feel of the gutter pipe. Whoever did so received a very severe electrical shock. Those who only stood on the stone sidewalk received only a violent shock, but those who stood on the iron grating felt a tremendous shock pass clear through the body, that was almost strong enough to knock one over. These shocks were dangerous. When informed of this condition of things the electrical light people sent a man to remedy the defect. No more wires should be permitted to be strung until there is a guarantee of ample protection to life and property from the electrical currents passing over the wires. The defective way in which the wires are now being strung endanger life and property.—*Troy Northern Budget, May* 15th, 1882.

Electric Light at Railway Stations.

The following is taken from the *Manchester Guardian*:—At Manchester for some months past the electric light has been in use at the Victoria and London Road Stations. At Victoria it was first introduced by the Lancashire and Yorkshire Railway Company, who have tried two systems of lighting by electricity. The London and Northwestern Company soon followed at Victoria, but did not introduce electricity in the lighting of their station in London Road. The Sheffield and Lincolnshire Company, however, took up the question and introduced electric lamps in their portion of the station. The Lancashire and Yorkshire Railway Company have given the light the longest trial, and their experience is that it has proved a complete failure. The light is brilliant, but it is marred by serious unsteadiness, and, besides, it has proved unreliable. On several occasions when crowded trains have arrived at the platforms the lights have suddenly failed, and the station has been plunged in darkness. Feeling that this was a great drawback to the efficiency of the electric light, the company have decided to discontinue its use, and on Saturday it was seen for the last time. On Sunday the station was lighted with gas in the ordinary manner, and for the present this will be continued. It is believed that the company intend to introduce improvements in the system of lighting, but that they intend to rely, at all events in the first instance, on their own engineers for suggestions. At the London and Northwestern end of the station on Saturday evening considerable inconvenience was caused by the failure of the electric light. A crowded train had just drawn up at the platform, but before the passengers were able to leave the carriages the light failed. The passengers were greatly alarmed and could not find their way about, and it was not until the gas lamps had been lighted that fear was allayed and quiet restored. Comment upon the above is unnecessary.—*Gas and Water Review.*

Distressing Accident

A special to the Cincinnati *Commercial*, dated Chicago, May 19th, contains the following account of a distressing accident occasioned by the explosion of a gasoline stove:

A terrible accident, resulting from carelessness, occurred this morning in the house of a Bohemian family named Martinique, at 121 Barber street. Kate Martinique, the mother, it appears, rose at an early hour and undertook to light a fire in the gasoline stove in the kitchen. The dangerous compound exploded, setting fire to the woman's clothing, the flames rapidly spreading through the house, igniting the bed in which Frederick Martinique, a boy of fourteen years, was sleeping, almost roasting him alive.

Mrs. Martinique, wrapped in flames, rushed screaming into the rear yard, followed by her daughter Josephine Martinique, a girl about 20 years of age, who clasped her mother in her arms in an agony of terror to save her life, an effort which was finally successful, but only after Josie herself had been severely burned about the face, hands and limbs. Assistance quickly arrived, and with much difficulty the fire in the house was extinguished, with the loss of, perhaps, $100 worth of furniture.

But when the three victims of the catastrophe were carried into a neighbor's house it was found that Mrs. Martinique was so terribly burned about the face, breast, and indeed the whole body, that there is very little hope of her recovery. The boy is also in a very critical condition, his left side, face, arms and feet having been scorched into a mass of raw flesh, and although his injuries are perhaps not quite so dangerous as his mother's, his sufferings are intense. Josephine was the only one of the three able to speak, and she told the story of the accident, and her heroic efforts to save her mother's life at the risk of her own, in a very touching manner. She She forgot all about her own sufferings in her anxiety to know the condition of her mother and brother, and when she learned that their recovery was very doubtful, her grief was very affecting.

Crustaceans and Light.

In a recent paper communicated to the Paris Academy M. de Merejowsky describes experiments in which he sought an answer to the question, "Do the lower crustaceans distinguish colors?" His answer is that it is exclusively the quantity, not the quality, of light that affects them. Larvæ of Balanus, a cirhipede crustacean, were employed, and some of the experiments were repeated on certain marine Copepoda. In a vessel that is quite dark these crustaceans are dispersed in all directions, but if daylight be admitted through a slit they collect about the centering beam. This occurs, too, when light of one color is admitted (a colored liquid being put before the slit). These crustaceans do not seem to be blind for any color (a result corresponding to what M. Bert observed in the case of Daphoides). But to find out whether they perceive colors as well, the following experiments were made:

Two slits being used for a beam of white and of colored light respectively, the crustaceans preferred the former beam, all clustering round it if the colored light was deep red or violet, and a large majority if that was of a brighter tint (yellow, green, or bright red). Comparing a beam of darker color, as violet, with one more luminous, as yellow, the crustaceans always preferred the latter. With two slits admitting colored rays of equal brightness, the crustaceans divided into two equal parts whatever the coloration (the author thus compared bright red with yellow, green and blue, and green with blue); but directly the brightness was rendered unequal the groups of crustaceans became unequal too. M. de Merejowsky concludes, then, that in perception of light there is a great difference between the lower crustaceans and man, and even between them and ants; "while we see different colors and their different intensities, the lower crustaceans see only a single color in its different variations of intensity. We perceive colors as colors; they only perceive them as light."—*The British Mail.*

Storage of Electricity.

The Brush company claim to have a secondary battery for the storage of electricity, in every respect the equal of the Faure battery, which will be ready to serve private consumers by November first. The Chicago *Times*, speaking of the order of the Council of that city requiring wires to be placed underground, says—

Before the city is torn up and defaced in the interests of electric lighting, it would be well to see what can be done by bottling electricity on the Faure principle, and carrying it around where wanted. Gentlemen who contemplate the erection of new gas works are invited to consider the subject of portable gas before they tear up all the streets for the laying of mains. The gas used by dentists is condensed into strong flasks of small dimensions and shipped to any locality. If gas could be purchased by the canful from a wagon, there might be such a thing as a real competition among gas makers. Doubtless the condensation and delivery of gas would cost something, but mains are also expensive. There is at least a chance for some investor to see whether he cannot be a benefactor of his race.

Correspondence

[The JOURNAL is not responsible for the opinions expressed by correspondents.]

Reduction in Price of Gas.

BRIDGETON, N. J., May 23, 1882.

Mr. Editor: The following are our prices for gas from July 1st, next—

10,000	feet per month	will be	$1.95 per 1,000
20,000	"	"	$1.90 "
25,000	"	"	$1.85 "
30,000	"	"	$1.80 "

Our present price is $2.50 per thousand, with a reduction to large consumers of from $2.40 to $2 per thousand feet. The reduction has been made voluntarily, there not being any clamor on the part of the consumers, nor to stave off an opposition company.

Respectfully,

B. F. HARDING.

THE AMERICAN
GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,
PROPRIETORS.

Editor—G. WARREN DRESSER.
Manager—C. E. SANDERSON.

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FRIDAY, JUNE 2, 1882.

Retirement of a Large Coal Firm.

The coal trade of Pittsburgh was surprised lately by the announcement that Messrs. Jos. Walton & Co. contemplated retiring from the business. This firm has been for some time the largest coal firm on the river. They employ in their three collieries alone 536 men, and pay out in wages to them almost $250,000 annually. Taking into account the men employed in handling, transporting, and marketing their immense product of 192,976 tons, the entire force of their employees will fall but little short of 1,000. The official tables show them to have been by 600 tons the heaviest shippers on the river last year. Seven towboats, five of them plying to Cincinnati and below, 188 barges, and 62 flats were required to get their coal from the mine to the market. The name of the firm is familiar to every coal dealer and river man from the Monongahela to the Gulf of Mexico, and its sudden and complete disappearance from the river will leave a large void.

The detailed statement of the property to be offered for sale, including everything, the coal property and improvements, the steamers and barges, even the coal in stock in the various ports, indicate that the retirement of the firm is to be absolute and complete. No reason is authoritatively given for the movement, but it has been rumored for some little time among operators that the senior member of the firm felt that he could afford to take a rest, and was anxious to retire from active business.—*Iron Age.*

A SCIENTIST says that a traveler who could make the circuit of the earth in 80 days would need 24 years for his journey around the sun. That settles it. We shall not attempt the latter journey. Twenty-four years is too long to be away from home, with the meter registering gas the same as if it was burned every night.—*Ex.*

Gas Stocks.

Quotations by G. W. Close Jr., Broker and Dealer in Gas Stocks.
(with W B Scott & Co.,)
34 PINE STREET, NEW YORK CITY.

JUNE 2, 1882.

☞ All communciations will receive particular attention
☞ The following quotations are based on the par value of $100 per share.

	Capital.	Par.	Bid.	Asked
Gas Co.'s of N. Y. City.				
Central	$466,000	50	70	75
Harlem	1,800,000	50	94	96
" Bonds	170,000			103
Manhattan	4,000,000	50	223	227x
Metropolitan	2,500,000	100	164	166
" Bonds	658,000	..	107	110
Mutual	5,000,000	100	96	98
" Bonds, go'd.	900,000	1000	202	205x
Municipal	1,500,000	100	180	186x
" Bonds	750,000		106	110
New York	4,000,000	100	120	122
Northern	270,000	50	—	100
Gas Co's of Brooklyn.				
Brooklyn	2,000,000	25	100	103
Citizens	1,200,000	20	67	70
" S. F. Bonds.	320,000	1000	105	109
Fulton Municipal	3,600,000	100	90	55
Peoples	1,000,000	10	45	—
" Bonds	290,000	.	104	107
" "	250,000	...	90	92
Metropolitan	1,000,000	100	50	55
Nassau	1,000,000	25	50	55
" Ctfs.	700,000	1000	93	96
Williamsburgh	1,000,000	50	50	60
" Bonds	1,000,000	...	100	101
Richmond Co., S. I.	300,000	50	70	75
" Bonds	40,000	—	—	—
Out of Town Gas Companies.				
Buffalo Mutual, N.Y	750,000	100	—	75
" Bonds	200,000	1000	95	100
Citizens, Newark	918,000	50	—	—
" " Bds.	124,000	—	10	10
Chicago Gas Co., Ills			125	—
Cincinnati G. & C. Co.			178	180
Consolidated, Balt.			38	39
Bonds			107	—
East Boston, Mass	220,000	25	122	128
Hannibal, Mo	100,000	100	95	100
Hartford, Conn	700,000	25	140	144
Halifax N. S	400,000	40	148	150
Hamilton, Ontario	150,000	40	117½	
Jersey City	750,000	20	155	160
Jacksonville, Ill	120,000	50	100	...
Lewistown Maine	400,000	100	—	100
Laclede St Louis Mo.	1,200,000	100	112	117
Montreal, Canada	2,000,000	100	173	174
New Haven, Conn		25	132	—
Oakland, Cal			32	33
Peoples, Jersey City		...	75	80
" " Bds.			...	...
Pittsfield, Mass			120	130
Rochester, N. Y.		50	70	80
Wilmington, Del.		50	174	...
Yonkers		50	30	32
St. Louis Missouri	600,000	50	250	254
San Francisco Gas-Co., S. Fr'isco Cal.			68	69
Toledo, Ohio			95	97
Troy, Citizens	600,000	100	—	—
Washington, D. C.	1,500,000	20	185	200
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"GAS INSPECTOR'S OFFICE, QUEBEC, March 7, 1882.

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N. LEVASSEUR, Inspector."

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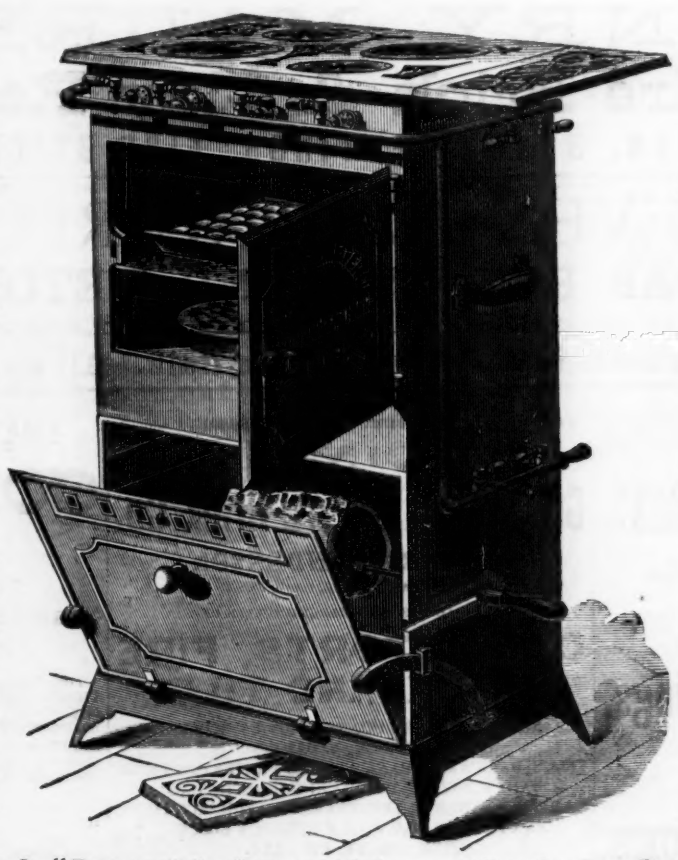

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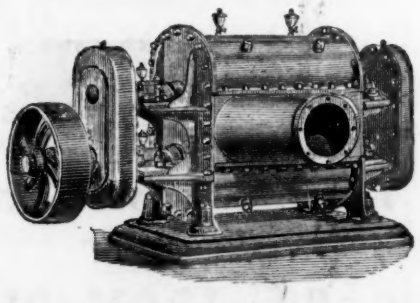

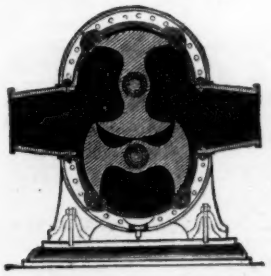

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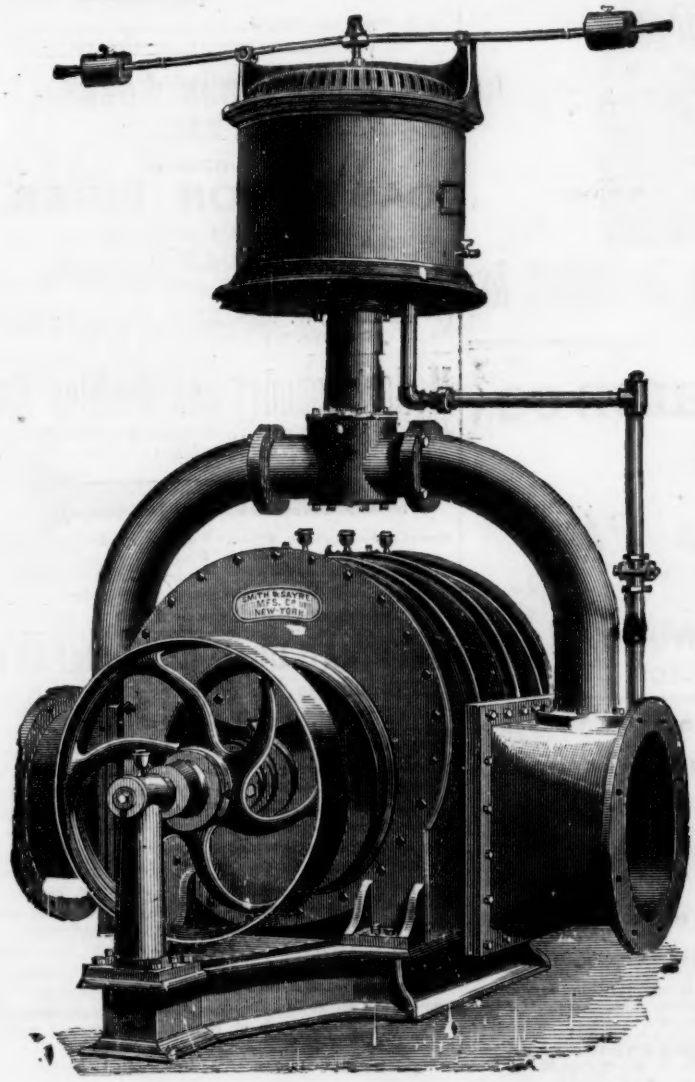

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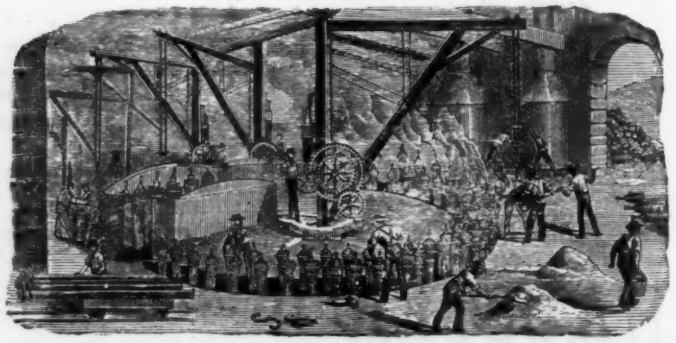

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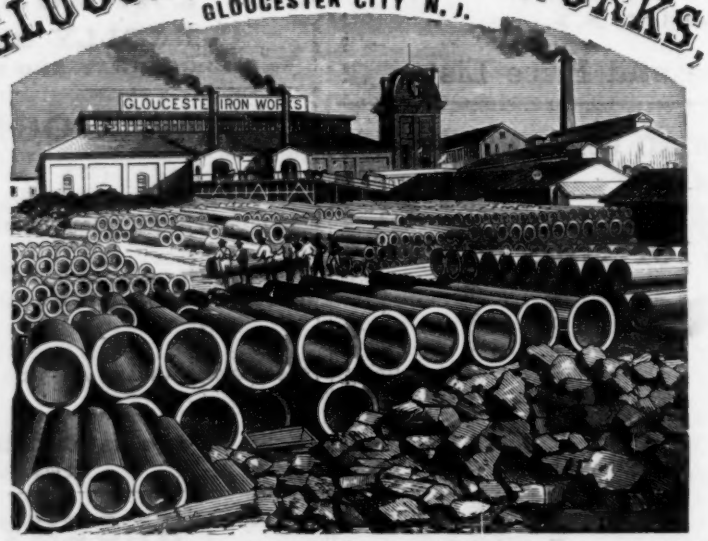

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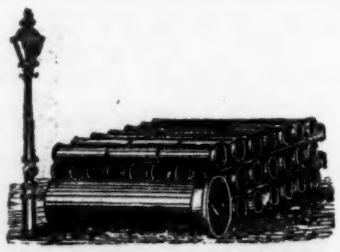

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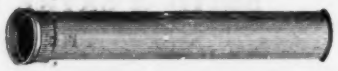

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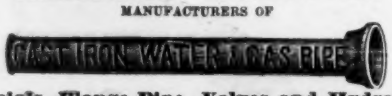

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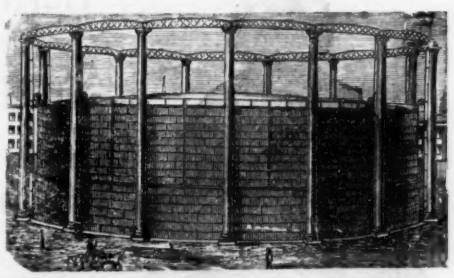

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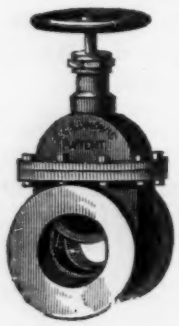

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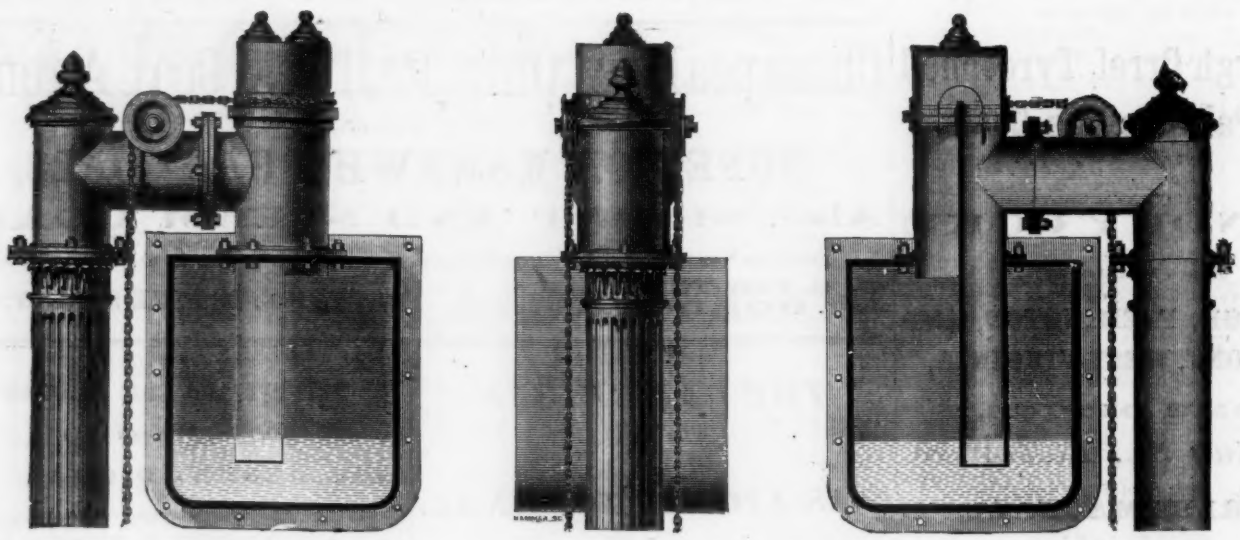

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PATENT FLAT-FLAME BURNERS

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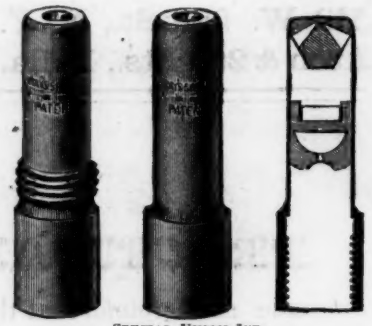

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The Special Burners are made for both High and Low Pressure. In ordering Burners our customers will confer a favor by stating the Pressure.

Bray's Patent Standard Slit-Union Burners do not Corrode in any Atmosphere.

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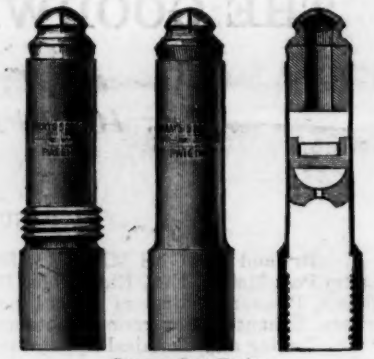
They give a Permanently Well-shaped Flame, free from Roaring and Flickering.



SPECIAL SLIT-UNION.

The "Special" Burners, as improved, are more adaptable to the requirements of gas illumination than any now before the public. They can be made to suit any pressure or quality of gas (including air gas). The gas inlet is so placed that it cannot be tampered with, and they are not liable to get out of order.

The following table and sentences in quotation marks are taken from the report of S. C. Ford, the United States Inspector of Gas and Meters at Washington, D. C., for the year 1881:

Description of Burner.	Pressure at points of ignition.	Actual consumption of gas per hour.	Illuminating power in candles at rate of actual consumption.	Illuminating power in candles, at rate of 5 cu. ft. per hour.	Value of one foot of gas in terms of standard candles.
	Inches.	Cubic Feet.	Candles.	Candles.	Candles.
Bray's Standard Slit-Union (30 candles....	.255	6.90	30.04	21.76	4.35
" Special Slit-Union No. 7.....	.50	4.74	19.30	20.25	4.05
" " " No. 6.....	.50	4.10	16.61	20.25	4.05
" " " No. 5.....	.50	4.24	16.97	20.01	4.00
" " " No. 4.....	.60	3.49	12.58	18.02	3.60
" " Union Jet No. 7.....	.50	4.84	19.13	19.76	3.95
" " " No. 6.....	.55	4.32	17.10	19.79	3.95
" " " No. 5.....	.60	4.14	15.65	18.90	3.78
" " " No. 4.....	.55	3.38	12.04	17.81	3.56
" Regulator Union Jet No. 7.....	.50	4.99	17.69	17.72	3.54
" " " " No. 6.....	.50	5.18	17.63	17.01	3.40
" " " " No. 5.....	.60	4.37	13.71	15.68	3.13
" " " " No. 4.....	.60	3.97	11.46	14.43	2.88

"On examination of the above table of tests, made with various burners, it will be observed that the illuminating power obtained with Bray's special burners Nos. 5, 6, and 7, both slit-union and jet form, was high; but with Bray's regulator burners only moderately good."

"The result of test with Bray's standard slit-union burner was highly satisfactory. This burner is best suited for street illumination, and will yield the maximum power obtainable from a cubic foot of gas."

"The special burners manufactured by Bray & Co. compare favorably with any yet inspected by this office. They are well made, and no doubt will prove very durable in practical use. They are best adapted for gases of high gravity."

Bray's Patent Standard Slit-Union Burners are of 30, 40, 50, 60, 70, and 80 candle power. The Patent Lanterns are adapted for burners of 50, 80, 100, 200, 300, 400, and 800 candle power, and are acknowledged to be the best lantern for street lighting yet invented. Price Lists and Circulars furnished on application.

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